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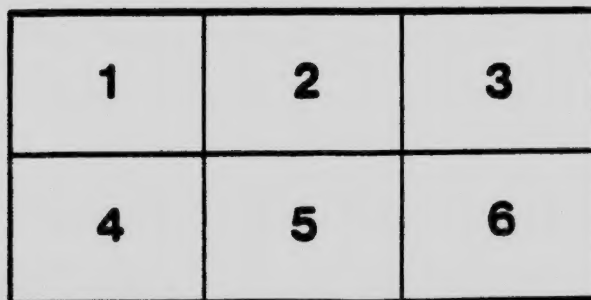
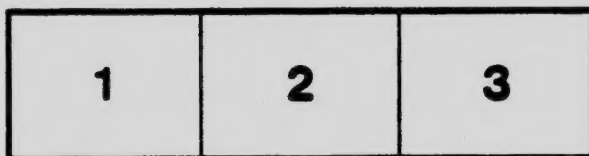
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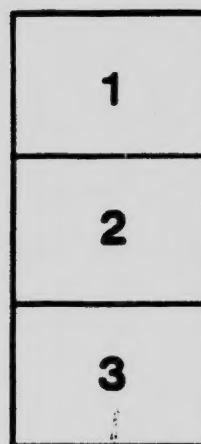
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DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

Principal Poisonous Plants of Canada

By
FAITH FYLES, B.A.
ASSISTANT BOTANIST

Bulletin No. 39
Second Series

Published by direction of HON S. F. TOLMIE, Minister of
Agriculture, Ottawa, Ont.

OTTAWA
J. DE LABROQUERIE TACHÉ,
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1930

DDN 4082901

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046676

The Honourable,
The Minister of Agriculture,
Ottawa.

SIR,—I have the honour to transmit herewith the manuscript of Bulletin 39 of the Second Series, on Poisonous Plants.

This bulletin has been prepared by Miss Faith Fyles, Assistant Botanist, and is profusely illustrated from drawings made by the author. These, with the many careful descriptions given of the various poisonous plants, make the bulletin a valuable one to those engaged in botanical studies.

The main object in its publication, however, is to give the farmer and stock-raiser a means of recognizing and identifying such poisonous plants as may occur on his pastures and ranges. Symptoms of poisoning by these plants are also described and methods of treatment indicated.

It is hoped that the bulletin will do much to lessen the present heavy annual loss among the various classes of live stock from the above cause.

I have the honour to be, Sir,
Your obedient servant,

Ma. 4, 1919.

E. S. ARCHIBALD,
Director Dominion Experimental Farms.





*Fruiting Plant of Canada
Moonseed, and Seed.*

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KEY OF LEAVES



1, Jack-in-the-pulpit; 2, Green Dragon; 3, Arrow Arum; 4, Water Arum; 5, Skunk Cabbage; 6, Death Camas; 7, Smooth Camas; 8, False Hellebore; 9, Blue Flag; 10, Slender Nettle; 11, Western Nettle; 12, Wood Nettle; 13, Poison Poke; 14, Purple Cockle; 15, Cow Cockle.



1, Cursed Crowfoot; 2, Tall Buttercup; 3, Small-flowered Buttercup; 4, Smaller Spearwort; 5, Pasque Flower; 6, Marsh Marigold; 7, Different types of leaves of Low Larkspur; 8, Different types of leaves of Tall Larkspur; 9, White Baneberry; 10, Different types of leaves of Canada Moonseed; 11, Blue Cohosh.



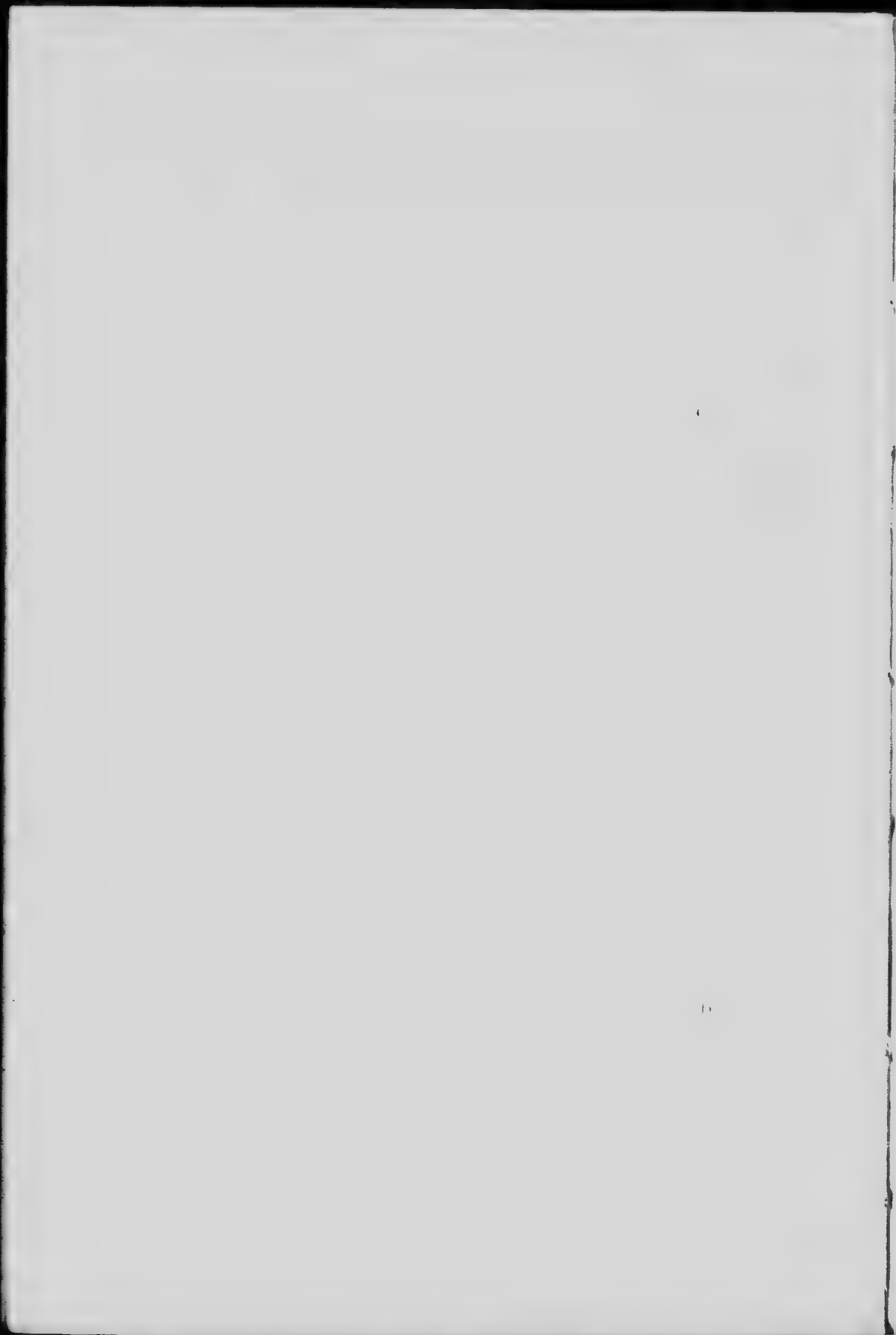
1, May Apple; 2, Blood-root; 3, Celandine; 4, Locoweed; 5, Lupine; 6, Sun-Surge; 7, Cypress Spurge; 8, Poison Ivy; 9, Poison Sumach; 10, Wicopy; 11, Mezereon.



1, Poison Hemlock; 2, Water Hemlock; 3, Water Parsnip; 4, Mountain Laurel; 5, Sheep Laurel; 6, Swamp or Pale Laurel; 7, Spreading Dogbane; 8, Black Indian Hemp; 9, Butterfly Weed; 10, Swamp Milkweed; 11, Common Milkweed; 12, Oval-leaved Milkweed.



1, Ground Ivy; 2, Bittersweet; 3, Threc-flowered Nightshade; 4, Common Nightshade; 5, Black Henbane; 6, Thorn Apple; 7, Indian Tobacco; 8, Great Lobelia; 9, White Snakeroot; 10, Sneezeweed; 11, Ragwort.



INTRODUCTION

The subject of poisonous plants is at all times naturally one of very great importance in every agricultural country, particularly in a country of such vast extent of fertile land as ours. It is more so, at the present time when the world-wide cry for food has turned the thoughts and intentions of farmers and stockowners to the necessity for greater production. In this greater effort, there is the danger of pasturage being restricted and overstocked and animals forced to eat plants they would otherwise avoid.

Although the yearly loss due to plant-poisoning is known to be on the increase, the amount of the loss is not ascertainable, owing to the fact that many fatalities are attributed to other causes through lack of knowledge and available literature. A knowledge of poisonous plants and the ability to distinguish the most harmful species in his neighbourhood are highly essential to every owner of live stock, so that he may be enabled to avoid pasturing animals on infested areas until the danger is past. This publication has been prepared with this end in view, as well as for the use of the general public and students interested in the subject. The descriptions and illustrations, it is hoped, will be of service in this connection.

Wherever possible, all scientific terms have been translated into ordinary English, and the most familiar of the common names given. The scientific names and synonyms of each species, as well as the scientific names of the families, have been inserted for the greater convenience of teachers and science masters. The symptoms have been given to assist veterinary surgeons in diagnosing cases of poisoning.

Since, in every case of severe poisoning, whether of human beings or animals, professional advice should be promptly summoned, no attempt has been made to cover remedial measures; but a few suggestions useful in emergencies have been given here and there. For general treatment of animals a supply of permanganate of potash and aluminum sulphate (alum) should be kept on hand. These drugs are inexpensive and may be obtained at any druggist's. A well-dissolved equal portion of each should be administered at the earliest possible moment after poisoning.

As this publication is the first of its kind in Canada, and as the information contained has been gathered from widely scattered sources, there is still a very great deal to be learned in regard to Canadian poisonous plants. For this reason it is hoped that all interested will send in suspicious plants for identification, to the Experimental Farm, Ottawa.

GENERAL HINTS FOR THE ERADICATION OF POISONOUS PLANTS

Wherever plants known to be poisonous are found, some effort should be made to destroy them, or prevent at least their multiplication. In most cases they may be simply dealt with as weeds, as annuals, biennials, or perennials.

ANNUALS: Annuals, which produce their flowers and seeds in one season, have no other means of propagation than seeds. Therefore any method, best chosen by the individual farmer, which will prevent the production of seeds will exterminate the plant. At the purple cockle, cursed crowfoot and Indian tobacco are all annuals, much loss may be avoided by mere hand-pulling or cutting when these plants are in flower.

BIENNIALS: Biennials, which bloom and ripen their seeds the second year, may be treated as annuals as far as the production of seed is concerned. They will eventually succumb to continued close cutting or to the use of the hoe or spud. Thorough cultivation and drainage where necessary is the better method on large and badly infested areas.

PERENNIALS: Perennials are propagated both by seeds and by underground rootstocks, bulbs, or tubers. The prevention of seed production is quite as important as the destruction of the underground portion of the plant, in many cases, more so, as the numerous light seeds borne to fresh soil will in time produce many more new plants than is possible by the division of the rootstocks. But in other cases, as for instance the water hemlocks, the portion in the soil is the most deadly, and any small piece uprooted and eaten by stock will result in death in a few minutes. Thus it is necessary for the extermination of the species and the safety of human beings as well as animals to destroy all portions of poisonous perennials by the quickest means possible.

SPRAYING: Chemical sprays may be used to advantage; they are economical and effective in most cases. Plants with rough leaves are most susceptible, as the spray clings to the surface more readily. Smooth leaves shed the spray before it has time to take full effect. The spray should be applied in a fine mist on a bright clear day when there is no likelihood of rain undoing the work. Spraying is most effective when the plants are young and succulent, that is, just before they flower or in their first bloom.

COMMON SALT OR SODIUM CHLORIDE: Common salt is one of the cheapest and safest sprays to use. It is most destructive when applied in hot dry weather, as it absorbs the moisture from the plants and the surrounding soil to such an extent that the plants die of thirst. A solution of 150 pounds to 60 gallons of water may be used where all vegetation is to be destroyed it may be applied in the form of hot brine, of such a strength as to show crystals on its surface.

CAUSTIC SODA OR SODIUM HYDROXIDE: This chemical is especially useful in destroying poisonous plants on waste ground or places where vegetation is negligible for a season. It may be used with good effect on poison ivy, spreading dogbane, and similar deeply rooted weeds. A 5-per cent solution, or one pound caustic soda to two gallons of water, is sufficiently strong for ordinary purposes. All other vegetation will be checked until this chemical is washed out of the soil.

IRON SULPHATE OR COPPERAS: Copperas is comparatively inexpensive and may be used on poisonous plants which may be growing among grain, grass, or pea crops. It will do no harm to these crops, but cannot be used where beans are planted. Clover and alfalfa plants are blighted by it, but they will quickly recover if the solution has not been too strong. The usual solution is obtained by dissolving 100 pounds copperas in 52 gallons of water, which quantity is sufficient for one acre of herbage.

COPPER SULPHATE OR BLUESTONE: Bluestone is more expensive, but a far less quantity will serve the same purpose. From 8 to 12 pounds is sufficient for 52 gallons of water. Both copperas and bluestone spraying should be done in clear, hot weather, when rain is not expected for at least twenty-four hours.

PLANTS POISONOUS TO DIFFERENT ANIMALS

The following list, in each case, does not include all the plants that are poisonous to the different animals, but only those through which most loss has been suffered.

HORSES: Ergot, bracken, horsetail, darnel, purple cockle, locoweed, water hemlock.

CATTLE: Ergot, bracken, darnel, purple cockle, cursed crowfoot, larkspur, locoweed, poison hemlock, water hemlock, water parsnip, laurel, white snakeroot, ragwort.

SHEEP: Ergot, darnel, death camas, purple cockle, pasque flower, lupine, locoweed, poison hemlock, water hemlock, laurel, white snakeroot.

SWINE: Darnel, purple cockle, water hemlock.

POULTRY: Ergot, darnel, purple cockle, and other injurious seeds in seedings.

ERGOT FAMILY (*Hypocreaceae*)

ERGOT OF RYE (*Spermatia Clavus* [D.C.] Fries.) (*Claviceps purpurea* Tul.)

PLATE I.

COMMON NAMES: Ergot of rye is generally known and spoken of as ergot; but occasionally in European literature, reference is found to "spur kernels," "blight kernels," and "spurred rye."

DESCRIPTION: Ergot is a form of a fungus parasitic on grasses, one of the best known species being that found on rye. The fungus is most easily recognized in the second stage of its development, when the hard, dark purple or almost black masses (sclerotia) are seen at intervals on the heads of rye, where they have usurped the position of the seed of their host. These sclerotia, or ergots, as they are popularly called, may be observed from June till late in the autumn, according to the nature of the species of ergot and host plant. In the autumn, they fall to the ground and remain in a resting stage throughout the winter. When the warm weather begins again, they show signs of awakening life by the appearance of small cracks, through which diminutive stalked bodies (stromata) make their way. In the head of the stroma are numerous flask-shaped cavities (perithecia) each of which contains a number of narrow cells (asci) and each of these in its turn contains eight thread-like spores or reproductive bodies. The mature spores escape from the perithecia about the time of flowering of the host plant, rye or grass, as the case may be. When a spore falls into a floret of a suitable host plant, it develops a so-called mycelium, and a honey-like substance called "honeydew" is abundantly produced. The honeydew exudes in large glistening drops from the floret. This sweet substance, which is eagerly sought by midges, flies and other insects, is filled with very minute microscopic bodies (conidia), another reproductive form of the fungus. The conidia are capable of immediate germination and are carried by insects to other plants. Thus what is known as "ergot disease" spreads rapidly throughout the flowering season of its host. The mycelial threads continue to develop, and in time form a dark compact mass two or three times the size of the seed of the host plant. This new ergot eventually falls to the ground and the life cycle is complete.

DISTRIBUTION AND HOST PLANTS: Dr. Staeger, of Berne, Switzerland, has firmly established the fact that each species of ergot has its own circle of hosts within which it moves exclusively. He has shown by successful experiments carried on for a number of years past, that ergot of rye will infect barley and the following grasses:

- Reed canary grass (*Phalaris arundinacea* L.);
- Sweet vernal grass (*Anthraxanthum odoratum* L.);
- Sweet or holy grass (*Hierochloa odorata* [L.] Wahlenb.);
- Meadow foxtail (*Alopecurus pratensis* L.);

PLATE I.



Ergot on grasses.

Photo—F. Fyles.

Tall oat grass (*Arrhenatherum elatius* [L.] Beauv.);
 Orchard grass (*Dactylis glomerata* L.);
 Quaking grass (*Briza media* L.);
 Canadian blue grass (*Poa compressa* L.);
 Kentucky blue grass (*Poa pratensis* L.);
 Meadow fescue (*Festuca elatior* L.);
 Reed fescue (*Festuca arundinacea* Schreb.);
 Barren brome grass (*Bromus sterilis* L.);¹

He has also shown that ergots grown on any of these grasses which have been infected by ergot of rye are in their turn capable of infecting rye and barley. This is a very important point for the agriculturist. For instance, if holy grass infected with ergot is left to mature, the ergots will drop to the ground and repeat their work in the spring. There will then be still fresh honeydew on the holy grass (which is early blooming) when the first heads of rye or barley come into bloom. The rye and barley may then be contaminated, and from them the honeydew will be borne to later-blooming fodder grasses, and so on through a continuous chain of harm.

POISONOUS PROPERTIES: The most important of the many constituents lately isolated from ergot is the very highly potent alkaloid *ergotoxine*, which with other harmful principles causes a disease known as ergotism.

ANIMALS AFFECTED: Ergot is poisonous to all domestic animals. Ewart states that "a comparatively small number of fresh ergot grains suffice to injure or kill a horse, cow, or sheep." It is a well-known cause of abortion.

HUMAN POISONING: Human beings have been poisoned by ergot from very early days, chiefly, however, in those countries where rye bread is used. The ergot is ground up with the grain, and the flour is thus rendered unfit for food.

SYMPTOMS: The symptoms of ergot poisoning have been well described by J. H. McNeil, as follows:—

"Ergot stimulates the nerve centres that cause the contraction of the small blood vessels supplying the different parts of the body, and cause one of the two forms of ergotism, viz., a nervous form and a gangrenous form.

"Nervous Ergotism: In this form the contraction of the blood vessels of the brain produces dullness and depression. The animal also suffers from gastro-intestinal catarrh, refuses food, and gradually passes into a condition of general wasting. The nervous form, however, may assume an entirely different aspect, and the animal dies suddenly in delirium or spasms, or gradually from paralysis.

¹ Ergot has been found on the following grasses in the West: *Agropyron Smithii*, *Deschampsia cespitosa*, *Agropyron tenerum*, *Agropyron repens*, *Calamagrostis hyperborea elongata*, *Bromus inermis*.

It is impossible to say, until further study has been made, whether this ergot is identical with the ergot of rye, or whether it may be one or more new species typical of the West.

"Gangrenous Ergotism: In this common form, the checking of the blood, resulting from the contraction of the small blood vessels, causes a loss of a part or of all the limb below the knee or hock, of the tail or the ears. The form of the disease may manifest itself by the formation of ulcers at the top of the hoof or between the toes, and a toe may be lost or the entire hoof shed. The affected part dries, a small furrow or line of separation appears, completely surrounding the limb, dividing the living from the dead mummified tissue."

We are indebted to the Veterinary Director-General at Ottawa for the following reports of recent ergot poisoning in Alberta presented by one of his inspectors, Dr. W. H. McKenzie:—

January 4, 1915.—I have inspected ninety head of cattle, twelve of which were suffering from ergotism. Necrosis of the inferior third of the tail, about one inch of the superior extremity of the ear, and both hind feet, was observed in one animal. In two others, both hind feet had sloughed off at the pastern joint, in another an indented ring circumscribing the hind leg about six inches above the fetlock joint, below which the tissue was gangrenous, in three one claw was absent. The other visibly affected animals exhibited swellings and lameness in one or both hind fetlocks. Animals had access to stacks of rye straw since about the first of November. Owner advises that first symptoms were observed on or about the first of December."

Five animals had already succumbed to the effects of the poison before the inspection of Dr. McKenzie. Receiving information of a similar case in the same neighbourhood, Dr. McKenzie inspected thirty-four cattle.

"Six animals were found to be showing the effects of this poison, being lame, having enlarged fetlock joints, and showing a pronounced tendency to resume the recumbent position. The grain bins and rye stack were examined and a considerable quantity of ergot found. The animals in question had been fed on rye straw for about four weeks, and a slight lameness was first observed ten days ago. I was informed that a neighbour who fed rye to pregnant sows had 28 abortions. All rye straw was burned, and owner instructed to thoroughly clean the rye grain before feeding same."

REMEDY AND MEANS OF CONTROL: In the case of ergot poisoning the best remedies are preventive. Care should be taken that no ergotised grain is sown. All grasses bearing ergot, wherever seen, should be cut and burnt. During the flowering season, there should be a vigilant search for heads showing the glistening honeydew. These infected heads should be gathered at once, taking care not to brush them against other grasses. Remember one drop of honeydew contains enough conidia to infect a whole acre of rye. Burn all ergotised hay, and clean thoroughly all barns and stalls where it has been stored. Should animals show symptoms of poisoning, their food should be changed at once, and the assistance of a veterinary surgeon should be procured.



Bracken.

Photo—F. Fyles.

FERN FAMILY (*Polypodiaceæ*)

BRACKEN (*Pteris aquilina* L.)
(*Pteridium aquilinum* [L] Kuhn.)

PLATE II.

COMMON NAMES: This plant is seldom known by any other name than common brake or bracken, sometimes modified to lady-bracken, fern-brake, or hog-brake.

DESCRIPTION: The bracken is a coarse fern with a creeping, woody, almost black rootstock. The stalk of the frond or leaf is from one to three feet high, and the blade measures from one to three feet across by two to four feet in length. The stalk, with maturity, becomes straw-coloured, or brownish, stiff, stout, ridged, swollen at the base. The blade is dull green, the general outline triangular, the widely spreading branches twice pinnate. In the spring the young leaves are bent over at the top and curled in. The oblong obtuse lobes are strongly outlined by the reflexed margin which forms, in this case, a second indusium or covering to the spore-cases. As the spore-cases develop, they push aside the outer indusium and, fitted close together in several rows, they form quite a distinct golden-brown margin to the underside of each lobe. The spores, or reproductive bodies, are ready for dissemination from July to September. The spore-cases open with a snap, and the spores, light and easily carried by the wind, are scattered far and wide. When they reach the moist earth they germinate, but the germinated spores do not produce a true fern-plant. They give rise to another stage of its life, a small flat, green body (prothallus). On the underside of the prothallus are tiny organs whose union results in the development of a true fern-plant, which in its turn produces spores and thus completes the life cycle.

DISTRIBUTION: Common in thickets, on hillsides, and in sandy soil from the Atlantic to the Pacific.

POISONOUS PROPERTIES: The toxic principles of bracken have not yet been fully investigated, but it has been shown by experiment that the action of the poison is cumulative.

ANIMALS AFFECTED: The experiments carried on by Hadwen in British Columbia (1917) proved that the ingestion of dried bracken was the cause of a disease among horses known as "staggers." He says: "During the hard winter of 1915-16 the mortality amongst horses in the Fraser valley and on Vancouver Island was very heavy. As an extreme instance we cite the following: 'In the little village of St. Elmo, B.C., out of twenty-four horses owned by eleven farmers, sixteen died of bracken poisoning,

four recovered, and the balance (four) did not take the disease.' The horses attacked are usually those that receive the minimum amount of care, but well-cared-for, greedy horses may contract the disease through eating their bedding, which often consists of bracken which has been left in their mangers." Hadwen also reports the poisoning of two horses from eating green bracken in a pasture where other vegetation was scarce. One of the horses died. Chesnut and Wilcox (1901) state that "Cases of poisoning of horses and cattle by this plant have been reported from England and from a few localities in the United States." Pott also refers to the poisoning of cattle by eating bracken in quantity. Stockman (1917) experimented with a bull-calf by feeding it freshly cut bracken for a period of twenty-nine days. The calf was found dead on the thirtieth day.

SYMPTOMS: The first general signs of poisoning as given by Hadwen are, an unsteady gait, good appetite, animal inclined to constipation, eye congested, flanks tucked up, nervousness. In the later stages if the head is raised the horse may fall. It stands with the legs spread, and has a distinctly intoxicated look. Greedy horses are most liable to attack.

Mueller, in reference to fatal poisoning among horses, gives the symptoms as timidity, slower movement or action, loss of balance, dilated pupils, reddening followed by yellowing of the conjunctivæ, and slowing of the pulse.

REMEDY AND MEANS OF CONTROL: In all cases of poisoning, professional advice should be obtained. The treatment recommended by Hadwen to the farmer who is unable to obtain such aid is as follows: First remove all ferny hay and bedding. Give a quart of raw linseed oil, taking especial care that none falls into the lungs. Give good clean hay, warm bran mashes, and roots. The horse should be kept as quiet as possible, owing to its nervous excitability. Warmth is of aid in combatting the affection, whilst a cold, draughty stable tends to lower the vitality.

Ploughing and manuring is one of the best methods of exterminating bracken. The deep-lying rootstocks will not all be destroyed the first year, but after two or three years of thorough cultivation, very few if any will be found.

On steep hill sides and pastures where tillage would be out of the question, cutting the green tops off will in time starve the rootstocks, particularly if a good dressing of lime is applied to the soil immediately after the cutting. The lime serves as a check to the bracken and also as an encouragement to the growth of grasses. In regard to the best time for cutting, Thomas Tusser wrote in 1557:—

"In June and in August, as well doth appeere
Is best to mowe Brakes of all times of the yeere."

HORSETAIL FAMILY (*Equisetaceæ*)

COMMON OR FIELD HORSETAIL (*Equisetum arvense* L.)

PLATE III (To face page 12).

COMMON NAMES: Among the popular names of horsetail are the following, which are typical and descriptive: pine-top, meadow-pine, scouring rush, bottle brush, snake-pipes, jointed rush, and cornfield horsetail.

DESCRIPTION: The horsetails or scouring rushes are a group of perennial plants intermediate between the ferns and club-mosses. Like the ferns they possess a more or less branching, creeping rootstock which persists from year to year and sends out new shoots each year. The rootstock of the field horsetail develops also short tuber-like branches, which act as storehouses of reserve material. As in some of the ferns, the rootstock sends up two distinct kinds of leaf-shoots, a fertile and a sterile shoot, each of which is distinctly jointed and hollow. The fertile stems, which bear the spores, or reproductive bodies, appear early in May, before the sterile or vegetative shoots have yet unfolded. They are from four to ten inches high, usually unbranched, light-brown, with darker brown, scale-like leaves arranged in circles at each joint or node. At the apex of each fertile stem is a group of sporophylls known as the cone, from which the spores fall to the ground and produce new plants. The spores are round, and each is furnished with two spiral bands or *elaters* (so attached as to appear to be four) which assist in its dispersal. The sterile stems are from four to twenty inches high, bright green, grooved, with angled, solid branches.

DISTRIBUTION: The field horsetail is native to Canada, and is found in gravelly or sandy soil from Newfoundland to Alaska.

POISONOUS PROPERTIES: The harmfulness of field horsetail has for many years been the subject of much discussion and difference of opinion, but in Canada it was found to be the cause of much loss (see Dominion Experimental Farms Reports 1910, p. 200, 1912, p. 210-11.) The toxic principle has not been determined.

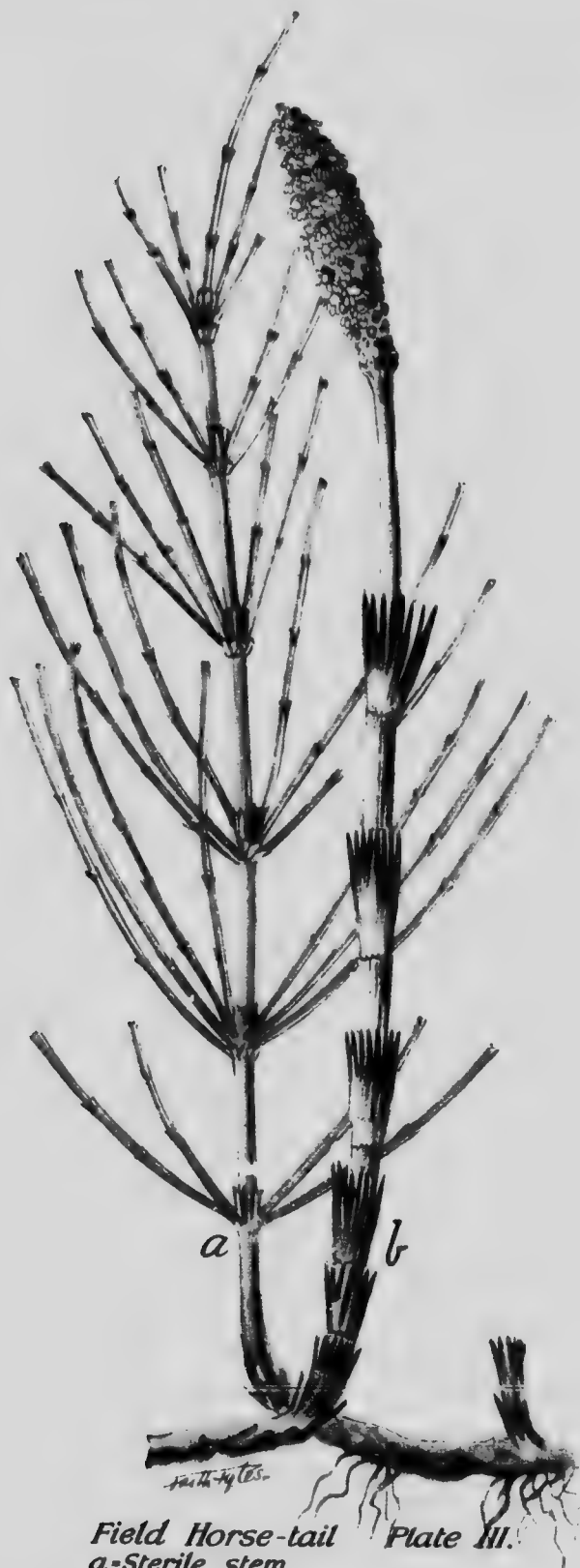
ANIMALS AFFECTED: Horses suffer most from eating this weed in the hay, particularly young horses. It is also known to be injurious to sheep, but there is a difference of opinion as to its effect upon cattle. The weed does not appear to be as poisonous when eaten in a green state. This may be due to the laxative properties of other fresh food eaten at the same time, or to the fact that the plant is not as common in pastures as in meadows and, in consequence, is not eaten to the same extent. Animals grazing in pastures containing horsetail, should be watched and removed from the field of danger at the first symptoms of poisoning.

SYMPTOMS: The first general symptoms are a certain excitement, unthriftiness, diarrhoea, good appetite; later, staggering gait, partial loss of motive power, craving for the weed, pulse accelerated, respiration difficult, sometimes convulsions and death or a state of unconsciousness and coma. Sometimes the attack is very acute, death occurring in a few hours; usually, however, the disease lasts from a few days to several weeks.

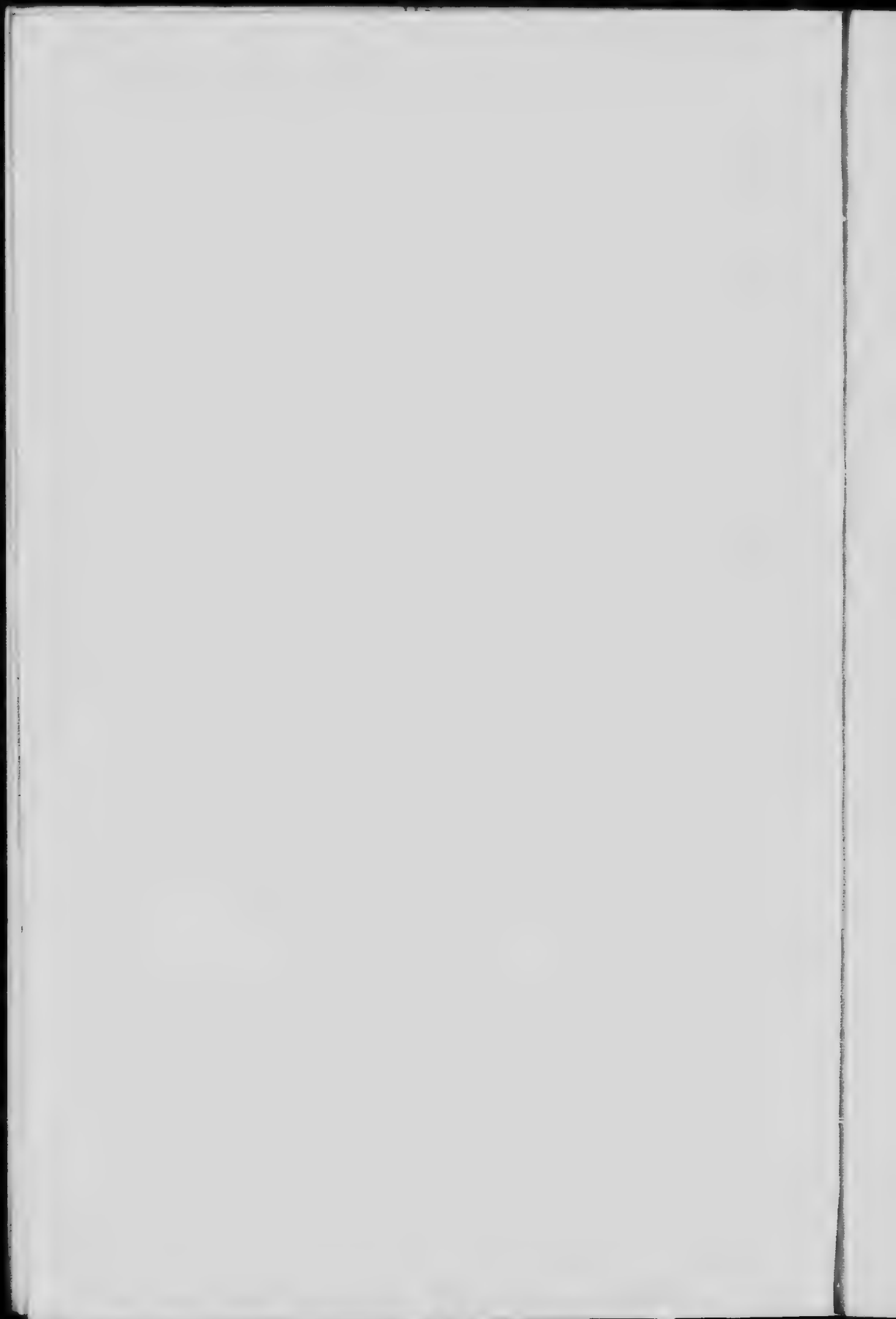
REMEDY AND MEANS OF CONTROL: The first and most important thing to be done is to change the food. Remove all hay and bedding containing equisetum. Administer a purgative, as raw linseed oil or aloes, to remove any undigested portion of the plant, and give stimulants, camphor, or powdered nux vomica with grain feed three times a day. Blisters along the spine are beneficial (Friedberger and Frohner). In severe cases, slings should be used to support the animal before it loses the power to stand. If this treatment is begun in time, the animals will recover in practically all cases.

This weed may be held in control by draining, enriching and cultivating the ground. It thrives best in sandy or gravelly soil that is wet in the spring and early summer, or where the underlying water is not far from the surface of the soil. Good drainage and good cultivation will eventually exterminate it as, although the rootstocks lie lower than the depth of ordinary cultivation, they will starve if the green food-producing shoots are kept cut.





Field Horse-tail Plate III.
 a-Sterile stem.
 b-Fertile "



GRASS FAMILY (*Gramineae*)

DARNEL (*Lolium temulentum* L.)

PLATE IV.

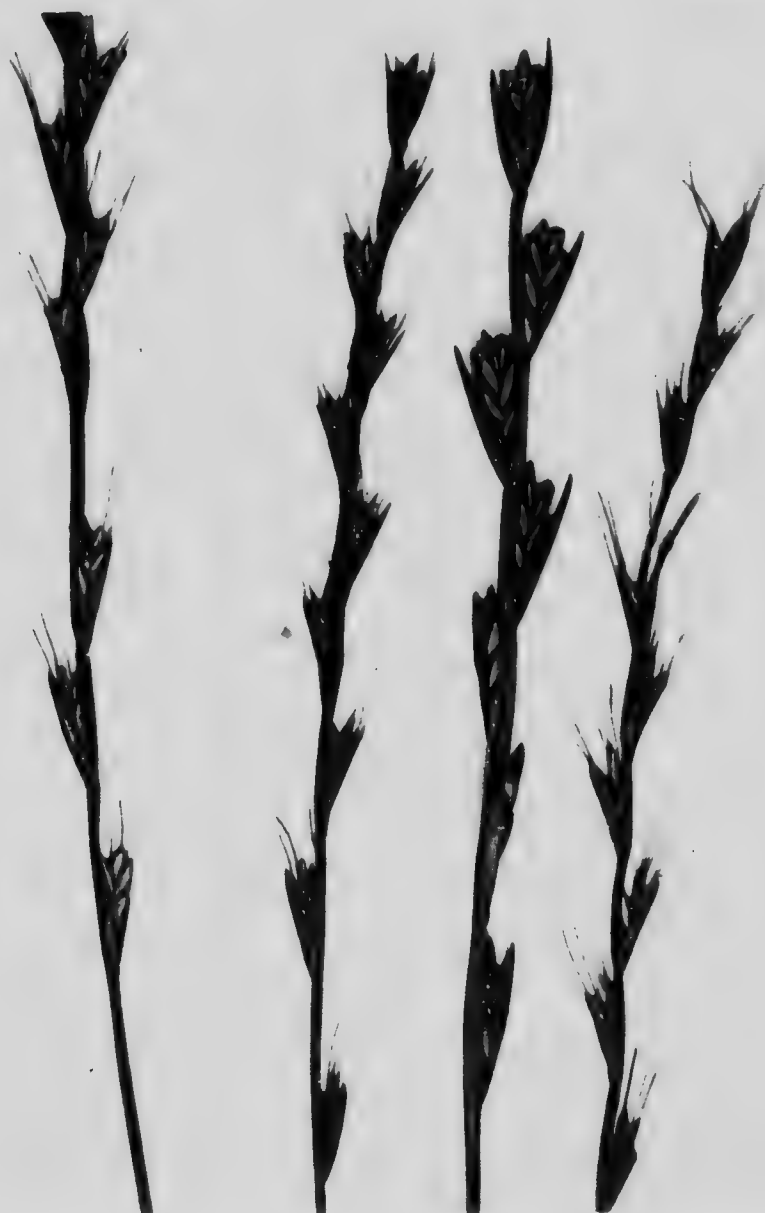
COMMON NAMES: Darnel is also called poison-darnel, white darnel, bearded darnel, and tare. The French name for it is "Ivraie," derived from "*ivre*" meaning drunken, as when brewed with barley it acts as an intoxicant.

DESCRIPTION: Darnel is an annual grass. It has smooth simple stems from two to four feet high. The leaf blades are four to ten inches long and about one-quarter inch wide, rough on the upper surface and smooth on the lower. The flower spike is four to twelve inches long, with four to eight flowers to each spikelet, which fits tightly into a slight curve on either side of the stalk. The seed is about the size of a small grain of wheat, it is rounded at each end, with a shallow groove on the inner surface, and is closely covered by two scales, the outer one usually possessing a short awn. The kernel itself is greenish, tinged with brown or purple. It is in bloom from June to August. Darnel is very closely related to English and Italian rye grasses, but may be readily distinguished from both in having no leafy shoots from the base, and consequently it does not grow in tufts or bunches.

DISTRIBUTION: Introduced from Europe, it is now scattered throughout Canada on cultivated ground and waste places in New Brunswick, the Prairie Provinces and on the Pacific coast.

POISONOUS PROPERTIES: The injurious effect of darnel has been recognized since early scriptural days, as there is no doubt it was really the tares which the enemy sowed among the wheat. There are also many references to it in the classics; Ovid says "Let the fields be clear of darnel that weakens the eyes." It is referred to in one of Shakespeare's plays as spoiling the bread, and in the same connection Gerarde (1597) says: "The new bread wherein darnell is, eaten hot, causeth drunkenness; in like manner doth beere or ale wherein the seede is fallen, or put into the mault."

The toxic principle seems to be only in the seed or grain itself, and has been determined as a narcotic alkaloid *temuline*, which Hofmeister has shown to be a strong nerve poison. Other authorities give different toxic principles, and some refer the cause of injury to a fungus which infests the seed. Esser concludes that according to most authorities who have investigated darnel the fungus alone contains the toxic substance—the *temuline*—and hence the grains in which the fungus does not occur should be harmless. H. C. Long, in referring to Esser's work, says: "So far as



Darnel.

Photo—F. Pyles.

can be ascertained, there have been no feeding experiments to determine the difference in toxic character between fungus-infested and fungus-free grains. The dangerous properties are said to be most pronounced in wet seasons."

ANIMALS AFFECTED: The "Veterinarian," 1842, reports the poisoning of pigs from eating darnel mixed with barley. Fatalities among horses and sheep have been recorded by Johnson and Sowerby (1861). Cornevin gives the amounts of darnel necessary to kill certain animals as follows:—

Horse.....	0.7 pounds per 100 pounds live weight
Ruminants.....	1.5 to 1.8 pounds per 100 pounds live weight
Poultry.....	1.5 to 1.8 pounds per 100 pounds live weight
Dog.....	1.8 pound per 100 pounds live weight

HUMAN POISONING: The chief danger to human beings lies in the difficulty of sifting darnel from wheat and other cereals of much the same sized grain. Ground up with the flour in this way, it has caused many cases of human poisoning, although not fatal. A case is quoted by Johnson and Sowerby in which eighty inmates of Sheffield workhouse (England) were affected with violent vomiting and purging after eating oatmeal containing darnel.

SYMPTOMS: Darnel poisoning induces giddiness, drowsiness, uncertain gait, and stupefaction (Mueller), and in the older animals, vomiting, convulsions, loss of sensation, and death (Pott). The symptoms in the horse are dilation of the pupils, vertigo, uncertain gait, and trembling. The animal falls, the body is cold and the extremities are stiff, respiration is laboured, the pulse is slow and small, and there are convulsive movements of the head and limbs. There is rapid enfeeblement, and death may occur within thirty hours.

In pigs, foaming, convulsions, and paralysis have been observed; the stomach and intestines were inflamed and the lungs congested (H. C. Long).

REMEDY AND MEANS OF CONTROL: As darnel is an annual grass it should be weeded out before it goes to seed. Badly infested crops should be cut green and used as hay. Land upon which the seeds have already fallen, should not again be used for grain until the rotation has included some hoed crops.

GRASSES CAUSING MECHANICAL INJURIES.

PLATE V.

The long barbed seeds and twisted awns of the porcupine grass (*Stipa spartea* Trin.) and the needle grass (*S. comata* Trin. & Aupr.) sometimes cause serious injury and even death to domestic animals. Sheep are the greatest sufferers, as the seeds are easily caught by their wool, and finally penetrate the skin and flesh.



Grasses causing mechanical injury.

Photo—F. Fyfe.

The spines of the sand-bur (*Cenchrus tribuloides* L.) and the bristles of the foxtail grasses and millets (*Setaria* sp.) are also of an injurious nature.

The sharply-pointed and awned seeds of squirrel-tail grass or wild barley (*Hordeum jubatum* L.) cause inflammation and ulcerating sores in the mouths of horses and cattle. A case was mentioned by Hadwen of two bloodhounds who suffered severely with ulcerated ~~esoph~~ and swellings in the throat caused by getting these seeds in the mouth.

Wild oats (*Avena fatua* L.) possess similar barbed and awned seeds, which become embedded between the teeth of animals, and cause inflammation.



ARUM FAMILY (*Araceae*)

JACK-IN-THE-PULPIT (*Arum trilobatum* [L.] Torr.)

PLATE VI.

COMMON NAMES: The Jack-in-the-Pulpit is also known as the Indian-turnip, three-leaved arum, dragon-turnip, devil's ear, bog-onion, and starch-wort.

DESCRIPTION: It is a perennial plant from eight inches to three feet high. It usually bears two leaves, sometimes only one. Each leaf has three leaflets, oval, pointed, smooth, entire or sometimes waved at the margins. The so-called "flower" is not only one flower, but is made up of a number of very small flowers arranged around a central axis (spadix) surrounded by a large, sheathing, coloured bract called the spathe. The spadix is popularly known as the "Jack" and the spathe forms his "pulpit." The spathe is pale green, striped with reddish-brown or purple, and is bent over at the top. The spadix is also green and purple, rounded at the top and narrowed at the base, where it is surrounded by the small flowers. In the autumn, the bright scarlet bunch of berries, with the withered spadix and spathe still attached, is quite as conspicuous as the Jack is in the early summer. The underground portion of the plant consists of a round, wrinkled, greyish-brown starchy corm, with a number of rootlets from the upper surface. It is found in bloom in the spring and early summer.

DISTRIBUTION: Jack-in-the-Pulpit is very common in low, rich woods throughout Nova Scotia, New Brunswick, Quebec, and Ontario. It is a native of Canada.

POISONOUS PROPERTIES: The plant contains acrid properties. The corm is very poisonous. It is held that the acridity disappears with roasting or boiling. No doubt it was used by the Indians, but it is safer for the white man not to try experiments. Pammel says the corm of the Indian-turnip is so extremely acrid that a decoction made from it has been used to kill insects.

GREEN-DRAGON (*Arisaema Dracontium* [L.] Schott.) ARUM FAMILY.

The green-dragon is a near relative of Jack-in-the-Pulpit, and possesses similar acrid qualities. It may be distinguished by its solitary leaf, which is characteristically cut into seven to eleven oblong pointed leaflets, and by its long tapering spadix and pointed green spathe. It is found on low grounds in Ontario. It flowers in June.



Jack-in-the-pulpit.

Photo - F. Fuls.

ARROW ARUM (*Peltandra virginica* [L.] Kunth.) ARUM FAMILY.

The arrow arum is a stemless plant found in shallow water in Ontario. It has arrow-shaped leaves, a long green spathe, green berries and thick, fibrous roots. The berries are poisonous.

WATER ARUM (*Calla palustris* L.) ARUM FAMILY.

This plant of bogs and shallow waters is sometimes called "the wild calla" because of its resemblance and close relation to the well-known cultivated calla. It is a low perennial with a long creeping rootstock bearing long-stalked, heart-shaped leaves, and a solitary scape. It has a short spadix and a white spathe almost as wide as long. The berries are bright red, subtended by the dried white spathe. This plant, which is native to Canada from Nova Scotia to Hudson Bay, also contains poisonous properties. The rootstock is particularly acrid.

SKUNK CABBAGE (*Symplocarpus foetidus* [L.] Nutt.) ARUM FAMILY.
(*Spathyema foetida* [L.] Raff.)

COMMON NAMES: The skunk cabbage is known by a variety of names, the most familiar being polecat-weed, swamp-cabbage, clump-foot cabbage, stinking poke.

DESCRIPTION: It is a perennial herb with a very strong, disagreeable odour. The short, broad spathe appears very early in the spring before the leaves. The spathe is swollen, thick, leathery, pale-green, closely-streaked and spotted with purple or reddish brown, pointed, enveloping the short, round spadix covered with small purple flowers. The leaves, which appear much later, are large, bright green, heart-shaped, short-stalked, veiny, and clustered on the short ridged stem. The spadix enlarges in fruit, and the round seeds are imbedded.

DISTRIBUTION: The skunk cabbage is a native of Canada, and is found in bogs and moist land from Nova Scotia to Ontario.

POISONOUS PROPERTIES: The whole plant contains acrid and noxious properties and has a strong, unpleasant odour. Cattle avoid it.

WESTERN SKUNK CABBAGE (*Lysichiton camtschatcense* Schott.)

The skunk cabbage of British Columbia is a very conspicuous plant at all times of the season; in the springtime by its large bright yellow spathe, in the summer by its leaves mostly three feet long and over a foot wide, and in the autumn by its long, stalked, large head of fruit.

Plate VII.

- Fig. a False Hellebore (leaf, flowers, roots.)
" b Death Camas
" c Seed-vessels of Death Camas
Reduced One Half



LILY FAMILY (*Liliaceae*)

ZYGADENUS OR DEATH CAMAS (*Zygadenus venenosus* Rydb.) (*Toxicoscordion gramineum* Rydb)

PLATE VII. FIG. B.

COMMON NAMES: *Zygadenus* is popularly known by a great variety of names, death camas being, perhaps, the most familiar. Other common names are poison-onion, poison-lily, poison-sego, camass, hog's-potato, mystery-grass, alkali-grass, soap-plant, squirrel-food, and lobelia. The last mentioned should not be used as it causes confusion with another poisonous plant, the Indian tobacco (*Lobelia inflata* L.).

DESCRIPTION: The death camas is one of the spring and summer flowers of the West. It is an erect, perennial herb growing from a coated bulb. The leaves are grass-like, long, narrow, and keeled, so much resembling the leaves of a grass or sedge that they are often overlooked in the search for poisonous plants. The flowers are arranged in an elongated cluster or *raceme*, simple or branched, at the top of the central flower-stalk, which is from ten to twenty inches high, rising above the leaves. The flowers are numerous, small, about one-quarter inch in diameter, yellowish or greenish white, each subtended by a leaf-like bract which is shorter than the slender stalk. The flowers bloom from about the middle of May to the end of July, but the flowering period varies with the season and altitude. The seeds ripen in their three-parted erect capsules in July and August, and germinate the following spring, producing the bulb and leaves only during the summer. The flowering stalk appears the year after. The plants grow more or less as scattered individuals, but sometimes in large masses or patches. These patches of the flowering plants are easily distinguished, even at some distance, by their peculiar greenish-yellow colour.

DISTRIBUTION: *Zygadenus* grows abundantly on many of the stock ranges of the West. It is found generally distributed from Saskatchewan to British Columbia. It is native to Canada.

POISONOUS PROPERTIES: The poisonous principle of death camas is an alkaloid, *zygadenine*, allied to *veratrine*, which is found in all parts of the plant. The toxicity of the flowering tops and the bulbs is about the same, but the seeds are much more toxic than other parts of the plant. Cases of poisoning, however, are more liable to occur early in the season, before the plants are in flower, as at that time the fresh green leaves are most tempting to stock, long deprived of green food. After seeding, the plant withers.

ANIMALS AFFECTED: In reference to death camas, T. N. Willing says: "Large numbers of sheep have been affected in the early summer by the prevalence of this weed (in southern Alberta) amongst the grass on which

they were grazing." It was proved by the United States Department of Agriculture that cattle and horses were also poisoned by *zygadenus*, but under ordinary conditions they could not consume sufficient quantity to cause death. The "fatalities were almost entirely confined to sheep."

SYMPTOMS: According to Chesnut and Wilcox, the first signs of poisoning are "a certain uneasiness and irregularity in the movements of the sheep. These irregularities rapidly become more and more pronounced, accompanied by inco-ordination of the muscular movements, spasms and rapid breathing. Although sheep are highly excited under the influence of *zygadenus* poisoning, the cerebral symptoms seldom constitute a condition of frenzy. It was readily observed that until a few minutes before death, ewes were able to recognize their lambs, and indicate in other ways that they were not in any sense crazed. The later symptoms were those of complete motor paralysis, combined with an exceedingly rapid and sharp breathing and a frequent weak pulse. The duration of these different stages of poisoning varies to a considerable extent, and depends entirely upon the amount of death camas which the sheep have eaten."

The principal symptoms are given by Marsh and Clawson as "salivation, nausea, muscular weakness, coma and sometimes attacks of dyspnoea."

In general, the symptoms in horses and cattle are similar to those shown by sheep.

REMEDY AND MEANS OF CONTROL: Medical remedies have been found of little use, as most of the cases are discovered too late for treatment. Rest and quiet are recommended. To prevent loss, it is important to recognize the plant and to avoid pasturing sheep upon it. Hargrave, however, has obtained good results by the use of permanganate of potash and aluminum sulphate administered in the very early stages of poisoning. He says "that for some years past sheepmen in the Walsh District, Alberta, have looked upon potassium permanganate and aluminum sulphate as almost specific in sheep poisoned with this plant, and, especially in cases recognized early, recovery follows in every instance. Some years ago the plant was so plentiful over the range that sheep herders were kept supplied with powders containing five grains of each, and carried with them a pint bottle so that on recognizing any sheep showing effects of poisoning, they at once dissolved the powder in a bottleful of water and immediately administered it as a drench. Very rarely was it necessary to administer the second dose."

In restricted areas, the weed may be exterminated by putting the land under cultivation for a time. After the spring rains, when the ground is soft, the bulbs may be readily pulled, and where the weed is less abundant it would be well worth while to incur the expense of hand-pulling.

SMOOTH CAMAS (*Zygadenus chloranthus* Rich.) LILY FAMILY.
(*Anticlea elegans* [Pursh] Rydb.)

PLATE VIII.

COMMON NAMES: Smooth camas is also known by other common names, the most familiar being swamp-camas, cow-grass, green lily.

DESCRIPTION: It is a much more attractive plant than the death camas. It grows to a height of one to three feet, with much larger flowers and leaves. The leaves, stalks, and bracts are of a whitish-green colour, the bracts sometimes tinged with red or purple. The flowers are greenish white or cream coloured, from one-half inch to nearly one inch broad. The perianth leaves are six, each with a large, green, heart-shaped gland at the base. The stamens are also six, their stalks erect about the ovary and the three stigmas. The flowers are in bloom about two weeks later than death camas.

DISTRIBUTION: Smooth camas is more confined to wet ground and calcareous soils. It is widely distributed, occurring from New Brunswick and Quebec to Manitoba and westward to British Columbia and the Yukon.

ANIMALS AFFECTED: Apparently all species of *zygadenus* are poisonous to animals, and contain the same poisonous alkaloid *zygadenine*. There is not, however, the same likelihood of serious loss among sheep, as smooth camas does not grow so abundantly in any one area and its period of growth is somewhat later in the season, when other herbage is prevalent and more tempting.

HUMAN POISONING: According to Marsh and Clawson, cases of poisoning have occurred among children who have eaten the bulbs in mistake for those of the edible camas, *i. e.* species of *Calochortus* and *Camassia*.

FALSE HELLEBORE (*Veratrum viride* Ait.) LILY FAMILY.

PLATE VII. FIG. A. (See facing p. 20.)

COMMON NAMES: *Veratrum* is commonly known as American white hellebore, Indian poke, devil's-bite, crow-poison, itchweed, and swamp-hellebore.

DESCRIPTION: False hellebore is a tall coarse perennial plant, from a foot and a half to eight feet in height. The stem grows from a short, thick, erect rootstock, and is leafy to the top. The leaves are broadly oval, plaited, strongly parallel-veined, entire, pointed, sheathing at the base, smooth on top, hairy beneath, six to twelve inches long, three to six inches broad, the upper becoming smaller and narrower. The inflorescence is a compound panicle from eight inches to two feet in length, the lower branches spreading or somewhat drooping. The numerous flowers are of



Smooth Camas.

Photo—F. Fyles.

a dull, yellowish-green colour, one-half to one inch broad; the perianth consists of six segments, with one stamen opposite each segment. The capsule is three lobed and three celled, containing numerous flat, winged seeds. The plant is found in bloom sometimes as early as May, but usually throughout June, July, and August.

DISTRIBUTION: False hellebore is found in low lands, swamps, wet woods, and on moist slopes in Eastern Canada. It ascends to high altitudes in British Columbia, but it is best developed in mountain valleys.

POISONOUS PROPERTIES: The whole plant is more or less poisonous, especially the short, thick rootstock, and coarse, fibrous roots. It contains an active poison known as *veratrine*, which belongs to the narcotic irritant group of poisons.

ANIMALS AFFECTED: False hellebore is poisonous to all animals. Cattle and horses avoid eating it wherever possible, as they do not relish the acrid, burning taste of the fresh plant; but young animals sometimes eat it, with fatal results. A. W. Sampson says that sheep eat it with impunity after a severe frost.

HUMAN POISONING: As false hellebore is used in the preparation of certain medicines, cases of poisoning have occurred from overdoses. Accidental poisoning of man from eating the plant has also been reported. In one case a whole family was poisoned by using the young leaves as greens in mistake for those of the marsh marigold (*Caltha palustris* L.). However, fatalities among human beings are rare, as the drug induces spontaneous vomiting. The hairy leaves are very irritating to the skin, and children often suffer by coming in contact with them.

SYMPTOMS: In general the symptoms of poisoning are salivation, vomiting, abdominal pain, diarrhoea, cold perspiration, depression of the heart, loss of sight, and finally death from paralysis of the heart.

REMEDY AND MEANS OF CONTROL: Professional advice should be obtained wherever possible. Treatment should be pursued by heart stimulants, such as alcohol or ammonia, and the external application of warmth. Demulcents, such as raw linseed oil, are given to relieve local irritation of the digestive organs. Young animals should be given warm water to assist vomiting and to wash out the stomach. Rest and quiet should be enforced. The roots of false hellebore should be grubbed out in the early spring when the ground is soft. Where the land is badly overrun by this weed, drainage and cultivation is the best method. In all cases seeding should be prevented by cutting off the tops when the plant is in its first bloom. On large areas of mountainous districts, cutting or grubbing would seem impracticable. Such infested land should not be used as a pasture. A. W. Sampson contends that sheep may be pastured on such land in the autumn, after the tops have been frozen and when the ground is hard enough to prevent the poisonous rootstock from being pulled up.

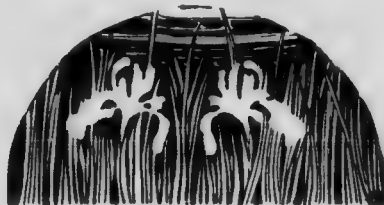
IRIS FAMILY (*Iridaceæ*)**BLUE FLAG (*Iris versicolor* L.)**

COMMON NAMES: The blue flag is also known as the wild iris, poison-flag, water flag, fleur-de-lis, flower-de-luce.

DESCRIPTION: The blue flag is an erect, perennial herb from one to two feet high, springing from a thick, fleshy, horizontal rootstock. The flowers are from three to four inches across, violet blue variegated with yellow, green and white towards the centre, with purple markings. The three outer parts of the perianth are larger than the three inner, upright, narrow ones. The three stamens are concealed under the style branches. The leaves are bluish-green, sword-shaped, overlapping. The seed-capsule is upright, oblong, with a stout beak splitting into three pockets containing many reddish-brown seeds somewhat three-cornered and flattened. The flowers are in bloom in May and June, sometimes even in July.

DISTRIBUTION: The flag is native to Canada, and is found from Newfoundland to Manitoba in wet places, along the borders of streams and shallow waters.

POISONOUS PROPERTIES: The rootstock is poisonous. It contains the acrid, resinous substance *irisin* or *iridin*. When eaten, it produces nausea, vomiting, purging, and pain. It is often mistaken for the sweet flag (*Acorus Calamus* L.) which is not poisonous, and is masticated by some people as a cure for indigestion. When in flower, the two plants are so dissimilar that they could never be taken for one another, but in the autumn when the roots are gathered, nothing remains of the upper portion of the plants. Even then, however, they may be distinguished by their odour, the sweet flag being pleasant aromatic, while the blue flag is unpleasant and nauseous.



NETTLE FAMILY (*Urticaceæ*)

SLENDER NETTLE (*Urtica gracilis* Ait.)

PLATE IX.

COMMON NAMES: The only other English name that seems to be given this species is tall wild nettle.

DESCRIPTION: The slender nettle is an erect perennial from two to seven feet high. The stem, which is usually simple, though sometimes branched, is armed with stinging hairs. The leaves are opposite, hairy, with slender bristly stalks, long pointed, usually rounded at the base, with sharply toothed margins. The small greenish-white flowers are arranged in compound clusters. The plants bloom in summer.

DISTRIBUTION: The slender nettle is common along fence rows, waste places, and moist ground generally, from Nova Scotia to British Columbia.

POISONOUS PROPERTIES: The nettles are not usually numbered among the poisonous plants, but they cause what is known as the "nettle rash" which is unpleasant enough to be avoided. As Pammel says, "it is an inflammatory disorder with a burning and itching sensation. It may come out in large or small patches, remaining for a few minutes or several hours."

Chesnut reports that hundreds of acres of land in Michigan and Wisconsin were made worthless by the dense growth of this species, and that horses refused to pass through it to cultivate the soil. He also says, "the stinging hairs of a closely related species, *U. holosericea* were the cause of the death of several horses in California in April, 1900."

OTHER SPECIES OF NETTLE.

The following species in Canada are equally injurious to the skin, and cause severe irritation and burning wherever they come in contact with it: The stinging nettle (*Urtica dioica* L.), the western nettle (*U. Lyallii* Wats.), the dwarf nettle (*U. urens* L.), and the wood nettle (*Laportea canadensis* [L.] Gaud.). Plate X.

REMEDY AND MEANS OF CONTROL: The burning and irritation of the skin may be relieved by the application of diluted alcohol.

The nettles are best kept in control by cultivation. Where tillage is impracticable, close and continued cutting during the summer is advised. Salt may be applied to check the new growth. In small patches the root-stocks should be grubbed out and burned, as well as any tops bearing seeds.



Slender Nettle.

Photo—F. Fyler.



Wood Nettle.

Photo—P. Fyles

POKEWEED FAMILY (*Phytolaccaceæ*)

POISON POKE { *Phytolacca decandra* L.)
 { *Phytolacca americana* L.)

PLATE XI.

COMMON NAMES: Poison poke is sometimes called scoke, pokeweed, pigeon-berry, and garget.

DESCRIPTION: It is a tall, stout, evil-smelling, perennial herb from six to nine feet high, with rich green foliage turning red in the autumn. The leaves are four to six inches long and two to three inches wide, petioled, pointed at both ends with entire margins. The veins start from the midrib and meet in scallops near the margin. The flowers are small, numerous in long racemes, with white calyx and green seed-vessel soon changing to the crimson calyx and deep purple berries of September and October. The seeds are black, brightly shining, arranged in a circle in the berry. The root is large, pale, dull yellow, with uneven ridges at intervals. In older plants, the branches of the root become massed together considerably, each branch being often more than three inches in diameter.

DISTRIBUTION: Poison-poke is native to Ontario. It is found on low ground and rich soil.

POISONOUS PROPERTIES: All parts of the plant contain acrid and somewhat narcotic properties. The juice of the plant will cause skin irritation. The root is very poisonous; in it are found a toxic substance *phytolaccotoxin*, an acrid alkaloid *phytolaccine*, *saponin*, and other injurious constituents. The fruit is also extremely poisonous. The young leaves lose their acidity when boiled, and are sometimes used as spinach.

ANIMALS AFFECTED: Cattle have been poisoned by eating the fresh young shoots, in places where the plant is growing abundantly.

HUMAN POISONING: Most cases of human poisoning have been accidental, either in overdoses of medicine or in mistaking the root for that of horse-radish or parsnip. Fatal cases of poisoning of children from eating the fruit have been reported by Chesnut.

SYMPTOMS: Poison-poke is a very powerful, although slow-acting emetic. Vomiting does not usually begin until after two or more hours. The symptoms are: nausea, vomiting, spasms, severe purging, and sometimes death from paralysis of the respiratory organs.

REMEDY AND MEANS OF CONTROL: Professional advice should be obtained. The plants should be grubbed out. If the roots and berries are not sold as drugs, care should be taken to destroy them entirely. Where cutting off would seem more practicable, coarse salt, carbolic acid, or coal-oil should be applied to the cut surface of the root to check new growth.



Poison Poke.

Photo—F. Fyles.

PINK FAMILY (*Caryophyllaceæ*)

PURPLE COCKLE—(*Agrostemma Githago* L.).

PLATE XII. (See p. 27-29.)

COMMON NAMES: The purple cockle is also popularly known as corn cockle, corn rose, and corn campion.

DESCRIPTION: *Agrostemma* means "the-crown-of-the-field." The richly coloured flowers waving among the ears of grain deserve the name, but its aptitude is lost, no doubt, upon the busy farmer who sees only a certain loss to his crop. It is a tall annual or biennial introduced from Europe, one to three feet high, more or less covered with silky hairs. The leaves are two to five inches long, narrow, pointed, with entire margins. The flowers are purple, pale towards the centre, with dark markings, from one to two inches wide. The petals are five, shorter than the long, narrow, pointed, and hairy sepals. The seeds are about 1/8 inch in diameter, black or of such deep purple as to appear black, rough, with rows of short, close teeth. The plant is in flower from July to August.

DISTRIBUTION: Purple cockle was introduced into Canada from Europe, and is now scattered throughout the country in grain fields and along roadsides.

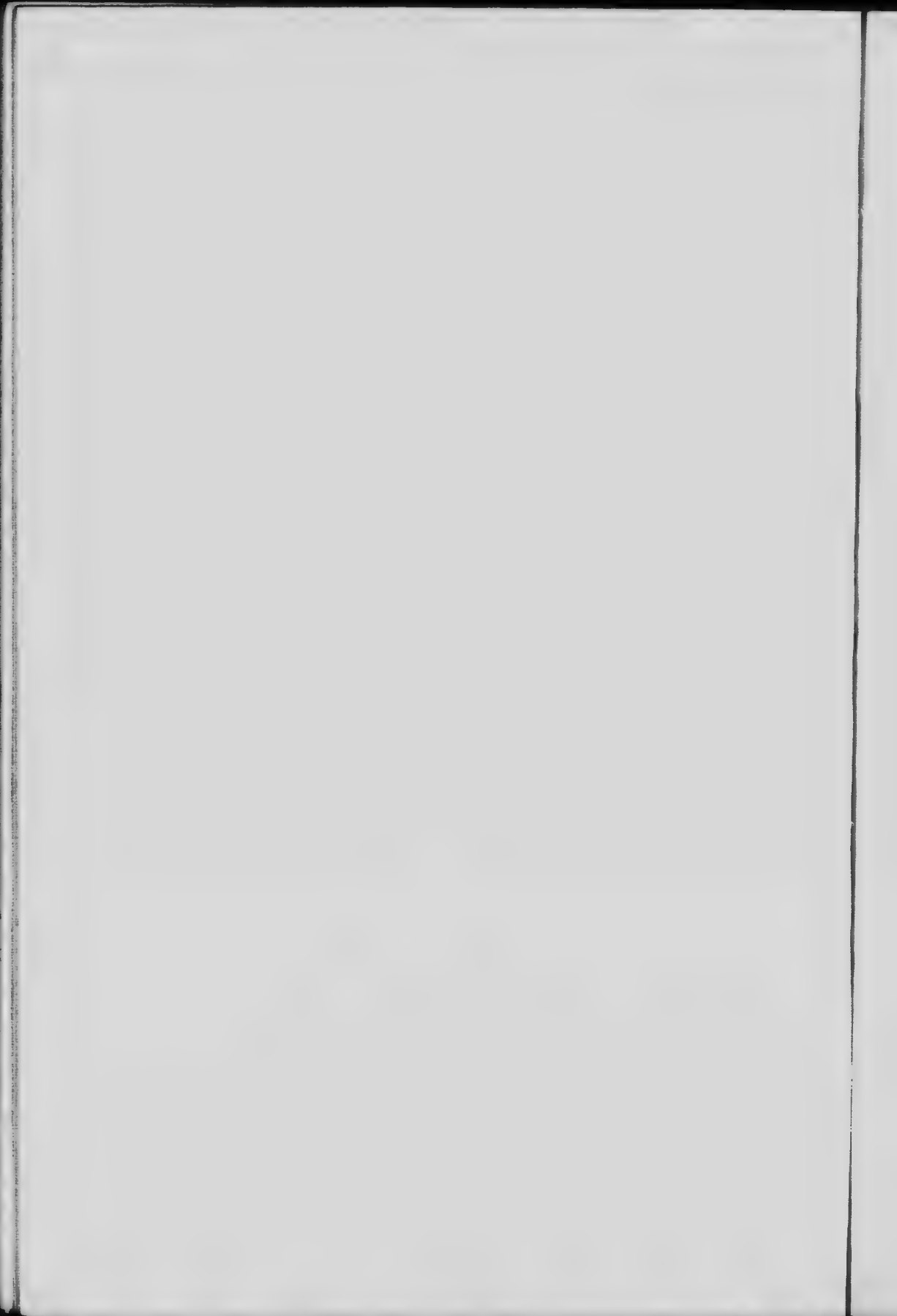
POISONOUS PROPERTIES: This weed, containing saponin, is poisonous both to animals and human beings. The seeds are most harmful. The seed capsules, being on a level with the heads of grain, and ripening at the same time, are cut and milled with the grain. Unless the wheat is very carefully screened, the flour is rendered unwholesome. The presence of the poison may be detected in lower grades of flour by its peculiar odour, and even by remnants of the rough, black, seed-coat. Very dangerous results may follow the repeated use of even a small quantity of this flour, as it will produce a chronic disease known as "githagism."

SYMPTOMS: The symptoms of chronic poisoning are: gradual depression, headache, nausea, diarrhœa, burning of the skin, loss of vigour in muscular movements and breathing, sometimes followed by coma and death.

Cornevin describes the symptoms in the acute form in the case of horses, cattle, and pigs. In the *horse*, if a small quantity only is taken, there is yawning, heavy colic, stamping and evacuation of rather soft fæces. If larger quantities are taken, the symptoms, which commence in about an hour, are salivation, frequent yawning and turning of the head, colic, pale mucus, hurried and weak pulse, rise in temperature, and accelerated respiration. Some time later there are muscular tremors succeeded by pronounced rigidity, and the fæces are diarrhœic and foetid. The animal lies down, and getting up is painful; it falls into a kind of coma, stretches itself to the utmost, and death takes place without convulsions.



Purple Chickadee Plate XVII.



In *cattle*, the symptoms observed one hour after eating are restlessness, salivation, and grinding of the teeth. Excitement and colic are followed sometimes by coughing, this state lasting from five to eight hours. There is then a period of coma, characterized by permanent decubitus, repeated foetid diarrhoea, hurried and plaintive respiration, accelerated and gradually weakening pulse, a gradual loss of motor and sensory powers, and a progressive decline in temperature. Death occurs in twenty-four hours.

In the case of *pigs*, the animal grunts, lies down and remains thus, with its snout embedded in the straw. There is vomiting, more or less violent colic and diarrhoea, the evacuation consisting of bad-smelling, spumous faecal matter. At times there are clonic contractions. Young pigs are most susceptible. (H. C. Long.)

REMEDY AND MEANS OF CONTROL: Weed out corn cockle before or not later than the first appearance of the purple flowers. Badly infested areas may be sprayed with copper or iron sulphate when the plants are in bloom to prevent the production of seeds.

SOAPWORT. (*Saponaria officinalis* L.) PINK FAMILY.

The soapwort or bouncing bet is a coarse, rather showy perennial plant, with large clusters of pale rose-coloured flowers, sometimes double, which is common along roadsides, in old gardens and neglected places, having been introduced from Europe in garden seeds. It is in bloom from July to September or later. The juice of the plant, when stirred in water—forms a froth like soapsuds, and has been used for sponge cloth. The whole plant, especially the root, contains the poisonous glucosidal substance *saponin*. No cases of poisoning have been recorded, probably due to the fact that animals avoid the plant and other nourishing food is abundant at the time. The saponin substances dissolve the blood corpuscles of all animals, causing stupefaction and paralysis, with vomiting and purging.

COW-CKLE OR COW-HERB. (*Saponaria Vaccaria* L.). (*Vaccaria* Britton). PINK FAMILY.

PLATE XIII.

The annual cow-ckle is closely related to the soapwort and the purple cockle. Like the soapwort it has smooth leaves and pink flowers, but the flowers are a brighter pink, smaller and on longer stalks. The plant contains *saponin*. It has been introduced from Europe, and is common in wheat fields in the West. The seeds, which are regarded as poisonous are common in wheat screenings. They are slightly smaller than those of purple cockle, reddish brown, round, with a flat band around the middle.



Cow Cuckle.

Phot. P. Fyles

BUTTERCUP FAMILY (*Ranunculaceæ*)

CURSED CROWFOOT (*Ranunculus sceleratus* L.)

COMMON NAMES: Other popular names given to this *Ranunculus* are biting crowfoot, celery-leaved crowfoot, blisterwort, and among its French names are *Mort au vaches*, *Herbe sardonique*.

DESCRIPTION: The cursed crowfoot is a stout, hollow-stemmed annual from six inches to two feet high. The leaves from the root are thick, with long and broad stalks, rounded or heart-shaped, three lobed and toothed. The upper leaves have very short stalks or none at all, longer lobes and fewer teeth. The flowers are pale yellow, small, about one-quarter of an inch broad, the petals about the same length as the sepals. The fruiting heads or clusters of seeds, which may be seen on plants still in flower, are oblong or cylindric. The plants are in bloom from June to August, sometimes earlier or later, according to locality and climatic conditions.

DISTRIBUTION: It is found in wet ditches, low lands, and swamps from New Brunswick to British Columbia.

POISONOUS PROPERTIES: As its name implies, the cursed crowfoot is one of the most virulent of our native species. It contains very acrid and poisonous principles. Any small portion of the leaf or flower, if eaten, will cause severe pain and serious inflammation, and if applied to the skin will raise painful blisters in a short time. Beggars in Europe use this and other species of buttercup to produce running sores. An old herbalist says, "Cunning beggars doe use to stampe the leaves, and lay it unto their legs and armes, which causeth such filthy ulcers as we daily see among such wicked vagabondes to move the people the more to pittie."

The chemical composition of the acrid and bitter juice of the buttercups is not well known, but it is thought that the substance is similar to the *anemonine* of the species of *Anemone*. The toxic principle is volatile, and the buttercups may be rendered harmless by drying or boiling. When dried with the hay they may be eaten by stock without injury. When fresh they are acrid and burning, causing intense irritation of the mucous membrane and inflammation of the intestinal tract. Some of the species, as for instance *R. repens* L., are hardly if at all injurious even in a green state, although one case of fatal poisoning to sheep has been recorded of this species.

ANIMALS AFFECTED: It is evident that under certain circumstances all animals are liable to suffer injury from the toxic principles of the buttercups, but they are considered especially dangerous to cows. It is stated that in man a single flower of *R. sceleratus* may give rise to poisonous symptoms similar to those caused by *Anemone* and *Colchicum*.

SYMPTOMS: Cornevin has shown that the cursed crowfoot induces gastro-enteritis, colic, diarrhoea with excretion of black, foul-smelling faeces, vomiting when possible, falling-off in milk yield in cows, nervous symptoms, reduction in pulse, and sterterous respiration, dilation of the pupils, enfeebled condition, difficult mastication, spasmodic movements of the ears, lips, etc., followed in serious cases by convulsions, sinking of the eye in its socket, and death in six to twelve hours after first convulsion.

The symptoms of poisoning in the horse, as given by Lander, are practically the same as the above. Pott records haematuria and reddish or bitter milk in cows.

Lander also reports an instance of sheep falling down suddenly when eating *R. repens*, their eyes rolling. They died in a short time, with their heads inclined over the left flank.

REMEDY AND MEANS OF CONTROL: The ordinary emetics and stimulants should be given, and professional advice obtained. The weed should be cut or pulled when in its first bloom to prevent the ripening of seeds.

TALL BUTTERCUP (*R. acris* L.) BUTTERCUP FAMILY.

The tall or meadow buttercup is an erect, hairy, perennial plant two to three feet high. The basal leaves are long-stalked, three to seven parted, each division cleft into linear crowded lobes. The upper leaves have shorter stalks, and fewer lobes. The flowers are bright yellow, numerous, about an inch in diameter, with roundish petals two or three times the length of the pointed sepals. The fruit clusters are round, one-quarter to one-third inch broad. The seeds are flattened, with a short beak. The plant is in bloom from May to September. It was introduced from Europe, and is now common in fields and on roadsides across the American continent.

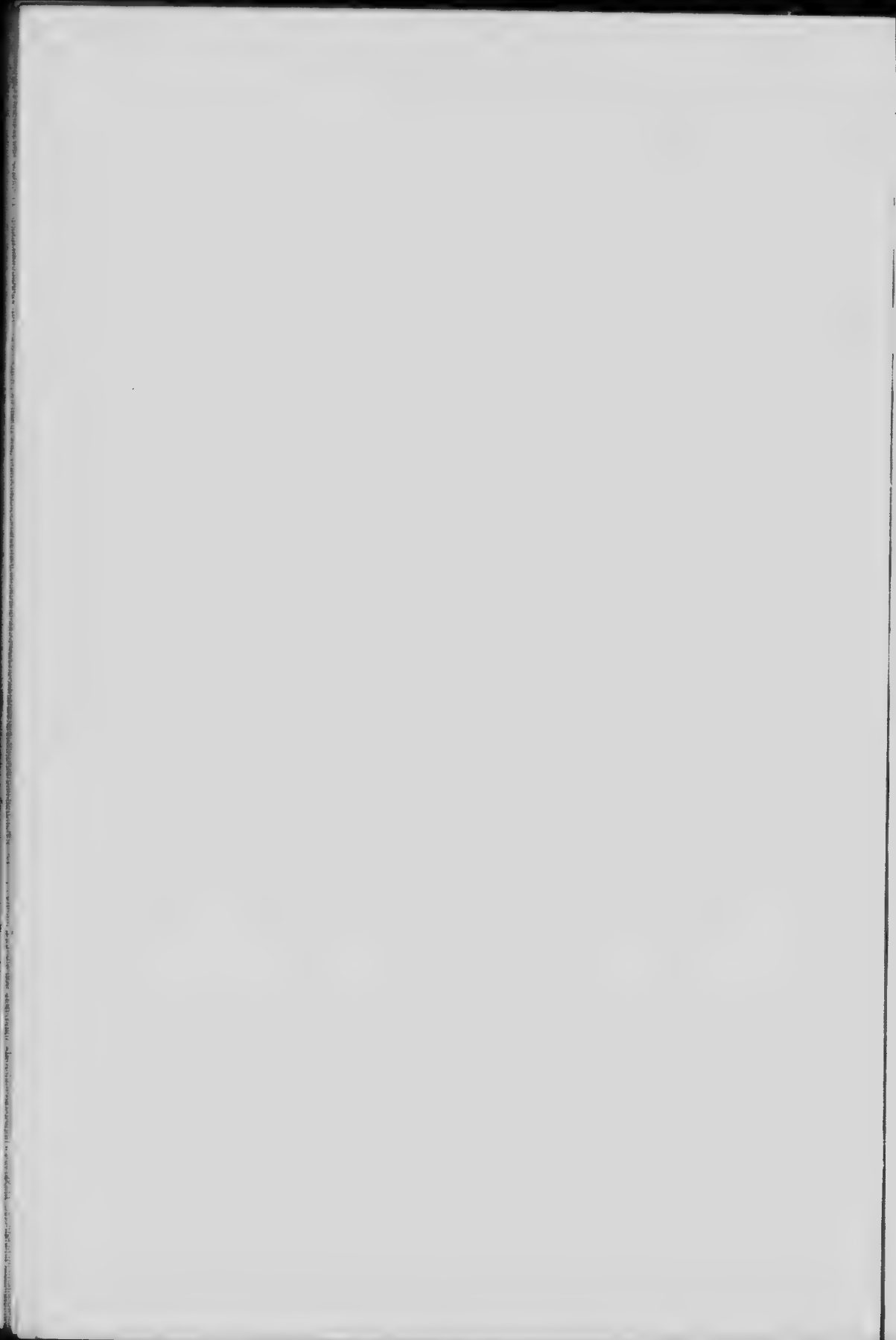
This species of buttercup is less harmful than the cursed crowfoot and, when dried with the hay, forms a large part of the fodder available in some districts, but it must be remembered that all the buttercups are of a poisonous character and under certain conditions and seasons are liable to become very injurious. Long states that "*R. acris* L., the acrid buttercup or tall crowfoot, is a frequent cause of poisoning in cattle," and Cornevin says "it is perhaps the species which causes the most accidents."

OTHER SPECIES OF BUTTERCUP.

Our native small-flowered buttercup (*R. abortivus* L.) which may be distinguished by its round heart-shaped root leaves and pale yellow flowers whose petals are shorter than the reflexed sepals, is equally capable of causing irritation and blistering, as is also the smaller spearwort (*R. reptans* L.). All other buttercups of the swamps and woods contain more or less acidity.



Pasque Flower *Plate XIV.*



PASQUE FLOWER { *Anemone patens* L. var. *Wolfgangiana* (Bess.) Koch
(*Pulsatilla patens* (L.) Mill.)

PLATE XIV.

BUTTERCUP FAMILY.

COMMON NAMES: This lovely flower is known under a variety of names, the most familiar being prairie anemone, American pulsatilla, Easter-flower, wild crocus, prairie-smoke, and sand-flower.

DESCRIPTION: The pasque flower is one of the most beautiful of the prairie spring flowers. It is a perennial, with a single, large, cup-shaped, violet-coloured flower, which opens before the silky grey-green leaves have appeared above ground. The fruit cluster is interesting, as each seed has a long feathery appendage which aids it in dissemination. The leaves, which appear later, are finely dissected. The plant is in bloom from early in March to April and sometimes in May.

DISTRIBUTION: This native plant is common on the prairies from Manitoba to British Columbia.

Poisonous Properties: Pammel says it is a "very poisonous plant. The different parts of the plant are entirely acrid and, when applied to the skin, cause irritation and vesication. The acridity of the plant is due to the presence of a crystalline substance called anemonine." Lloyd states: "The vapours evolved from the fresh juice are of such an acrid nature as to have inflamed the eyes and have closed them temporarily. For this reason persons refuse to work with the fresh herb."

It is interesting to note that Mr. T. N. Willing drew the attention of stockmen to the injury caused by this plant in 1903 as follows:—

"CROCUS ANEMONE.—This is a beautiful purplish cup-shaped flower. It is very abundant in some localities in the early spring. Close observation on the part of some Alberta shepherds showed that deaths were frequent in a bunch of sheep after feeding greedily on these flowers, and a microscopical and chemical investigation by Professors Fletcher and Shutt, of Ottawa, proved that numerous balls of felt, composed of the fine hairs with which the plant is covered, formed in the stomachs and impaired the digestion to such an extent as to frequently prove fatal. I have, however, taken from an old sheep as many as seventeen balls which varied in size from a marble to a large egg. This ewe was known as a 'piner.' A shepherd should avoid letting his sheep graze where the anemone is abundant."

MARSH MARIGOLD. (*Caltha palustris* L.) **BUTTERCUP FAMILY.**

COMMON NAMES: The marsh marigold is also called cowslip, king-cup, meadow-gowan, water-dragon, may blob-, soldiers-buttons, water-goggles.

DESCRIPTION. The marigold, a perennial, is one of the showy members of the buttercup family, with its abundant yellow flowers and luxuriant foliage. The stems are smooth, hollow, and furrowed. The leaves are round or kidney-shaped, with a slightly scalloped or even margin. There are no petals, but the broad, bright sepals take their place. The stamens are numerous. The seed pods are somewhat flattened, spreading, short-beaked, and many-seeded. The plant is in flower from April till June.

DISTRIBUTION: The marsh marigold is a native of Canada, and is found in swamps, wet meadows, and along streams from Newfoundland to Saskatchewan.

POISONOUS PROPERTIES: Like most of the species of buttercup, the marsh marigold contains acrid poisonous properties, and both man and animals have suffered. Cattle have died from eating it, although as a general rule, they, as well as sheep, avoid it unless urged. Macleod reports the poisoning of several horses, one of which succumbed. Macleod in a young state the plant is harmless and is eaten boiled as greens, but Cornevin states that it becomes toxic by the time of blooming and that the toxicity increases with maturity. If eaten after the flower buds have unfolded, it is likely to cause extreme nausea and pain in the abdomen. A. B. Smith holds that the toxicity is due to the alkaloid *jervine* and the glucoside *helleborin*.

When dried with the hay, according to H. C. Long, the plant is harmless, but Rusby states it causes diarrhoea and loss of milk production.

SYMPTOMS: According to Cornevin the symptoms are similar to those produced by buttercup poisoning, *i. e.* diarrhoea, loss of milk production, colic, bloating, inflammation of the bladder, etc. Johnson and Sowerby mention the case of five persons who, after eating marsh marigold as a herb, were "seized with violent sickness and pain in the abdomen, followed by diarrhoea and general oedematous swelling over the whole body."

OTHER SPECIES OF MARSH-MARIGOLD.

The western species, no doubt, contain similar poisonous properties and should be viewed with suspicion, although no cases of poisoning have been reported.

The yellow marsh-marigold (*Caltha asarifolia* DC.) is the only western species with yellow flowers. It resembles the eastern species in general appearance, and is found in marshy meadows in British Columbia and the Yukon.

The mountain marsh-marigold (*C. leptosepala* DC.) has white flowers, usually tinged with blue on the outside. It grows in wet alpine meadows in Alberta, British Columbia, and the Yukon. The two-flowered species (*C. biflora* DC.) has numerous stem leaves and white flowers with one stalk shorter than the other. The dwarf marsh-marigold (*C. chelidonii* Greene) grows from two to four inches high. Its leaves are round, heart-shaped and its flowers white. It is found along alpine streams and below the snow.

THE LARKSPURS (*Delphinium* sp.) BUTTERCUP FAMILY.

PLATE XV.

COMMON NAMES: The larkspurs are sometimes referred to in literature as knight's spurs, lark's-heel, lark's-claw and stavesacre. In France the common names are pieds d'alouette, herbe Sainte-Athalie, fleur d'amour.

DESCRIPTION: They fall naturally into two groups, the tall and the low or dwarf species. The tall larkspurs, of which there are several species in Western Canada, grow from three to six feet high. The general outline of the leaves is round but they are deeply palmately cut into three to seven lobes like the leaves of the buttercup, the sections being very narrow or broadly wedge-shaped according to their number. The flowers are arranged in a narrow, sparingly-branched panicle or simple loose raceme from four to ten inches in length. Each flower is about an inch or an inch and a half broad, with a spur projecting at the back. The colour varies from a bright blue to a dull purplish blue, or in some species very pale violet and yellow. The seed vessels are about half an inch long, erect, dry, ending in a short beak. The seeds are numerous, small, with a loose coat. The plants are in bloom during June and July, sometimes earlier or later according to season and locality. The low larkspurs are similar in general appearance but are only six inches to three feet in height.

DISTRIBUTION: Practically all of the species of larkspur growing wild in Canada are native. They are common in Alberta and British Columbia.

POISONOUS PROPERTIES: The toxic nature of the larkspurs has been recognized since early classic days, but it is only in comparatively recent literature that reference is made to them as some of the most important of the stock-poisoning plants. The greatest losses occur in North America. Chesnut says, "They have proved nearly as fatal to stock as the water hemlocks, and probably kill a larger number than any other class of plants."

As far as can be determined, the poisonous principles of only a few of the Canadian species have been studied. In 1913, Loy, Heyl, and Hepner isolated an alkaloid in an impure form from two species in Wyoming which also grow in Canada, *D. nelsonii* and *D. glaucum*. In 1910, Marsh and Clawson carried on feeding experiments with several species—including *D. menziesii* and *D. bicolor*, two low larkspurs of the West—which proved them to be highly poisonous to cattle. Two European species, *D. Consolida* and *D. Staphisagria* contain the four alkaloids, *delphinine* which is very poisonous and bitter, *delphisine* which is extremely poisonous, *delphinoidine* also poisonous, and *staphisagrine*. No doubt the closely related Canadian species are of a similar nature. Marsh and Clawson, who have carried on extensive work with several species in the Western States, came to the conclusion that other species had the same properties as those experimented with, and that there was no marked difference in toxicity between the different species of larkspur.



Larkspur.

Photo F. Fyles.

The low larkspurs are poisonous during the whole season of their growth, but as they dry up and disappear in the early summer, poisoning usually occurs in the early spring.

The tall species live throughout the summer, but their toxicity diminishes after they flower, and they become coarse and less tempting. Therefore, although the seeds are very toxic, cases of poisoning occur chiefly in the spring when the green parts of the plant are most poisonous and afford an abundance of fresh green. In regard to the seeds, H. C. Long says they "are the most dangerous part of the larkspur, and should never be ground up with wheat should the two plants grow together." The loss of three head of cattle was reported to us (1918) from Barrhead, Alta., from eating the seed vessels of larkspur containing seeds. These had been cut and dried with the hay.

ANIMALS AFFECTED: In the feeding experiments mentioned above, it was shown that the larkspurs were poisonous to cattle and horses but not to sheep. Horses, under ordinary conditions, do not eat sufficient quantity to do harm, so that losses from larkspur poisoning are chiefly confined to cattle. Pott states that *D. Consolida* is an acute narcotic poison to horses and cattle.

SYMPTOMS: The general symptoms of poisoning both from the tall and the low larkspurs are as follows: salivation, nausea, vomiting, weakness, colic, twitching of the muscles of the sides and legs, convulsions, and general paralysis. If the animal does not recover, death usually occurs in a few minutes or a few hours.

REMEDY AND MEANS OF CONTROL: Marsh and Clawson found in their experiments with antidotes that beneficial results were obtained by using "hypodermically, injections of physostigmin salicylate, pilocarpin hydrochlorid, and strychnin sulphate, followed by hypodermic injections of whisky when needed."

They also pointed out that "if in the beginning of the poisoning some remedy could be used which would quickly stimulate the intestinal excretion, it might serve to save the lives of animals."

As regards the eradication of larkspur, choice of methods must depend entirely upon conditions and circumstances. It may be pointed out that the loss of a single steer will cover a large amount of the cost of grubbing out this weed. The yearly loss of several head of cattle on a single farm and the cost of destroying the weed is best calculated by the owner. Where entire extermination is impossible, the first year or two, the number of the plants may be so reduced as to avoid actual loss by poisoning. In most cases the surest means of killing the plant is to cut off the roots from six to eight inches below the surface of the soil. The work should be done thoroughly to prevent the growth of new shoots. All tops cut off should be destroyed at once.

WHITE BANEERRY (*Actaea alba* [L.] Mill.) BUTTERCUP FAMILY.

COMMON NAMES: Other names given to the white baneberry are coral and pearls, white beads, necklace-weed, white berry.

DESCRIPTION: The white baneberry is a perennial herb with large, wide-spreading, compound leaves. The very small white flowers are arranged in an oblong cluster at the end of the stalk. The flower cluster elongates as the fruit forms, sometimes reaching a length of three to four inches. The berries are about half an inch long and nearly as wide, bright white with a black spot at the end. The berry stalks are about as long as the berry and become thickened with maturity, turning a rich red, slightly swollen at each end like broken bits of the common red coral. At this stage they are very attractive and tempting, especially to children. The plant is in bloom in April and May, a week or two later than the red baneberry.

DISTRIBUTION: This species of *Actaea* is a native of Canada, and is found in rich woods in the eastern provinces, tending to spread westward.

POISONOUS PROPERTIES: The white baneberry is a variety of the European species, *A. spicata* L. of which Hill says in his Herbal (p. 320) that children who have eaten the fruit have died in convulsions.

SYMPTOMS: The European baneberry, *A. spicata* L. is classified in the group of plants containing poisons which act upon the heart, of which group A. B. Smith gives the following symptoms: numbness and tingling in the mouth, abdominal pain, vertigo, purging, tremor, occasional delirium, paralysis, dyspnoea, ending in syncope.

REMEDY: Warn children against eating unknown fruits in the woods. Should poisoning occur, the usual emetic may be given and the advice of a doctor obtained as soon as possible.

RED BANEERRY (*Actaea rubra* [Ait.] Willd.) BUTTERCUP FAMILY.

PLATE XVI.

COMMON NAMES: The red baneberry is also known as the poison-berry, snake-berry, toadroot, herb-christopher.

DESCRIPTION: Like the white baneberry, this plant is a perennial with large, wide-spreading compound leaves, but the leaflets are thicker and more coarsely toothed. The cluster of small white flowers is nearly as wide as it is high. The flower stalks are slender and *do not become thickened* in fruit. The berries are about half an inch long, widest in the centre, brilliantly cherry-coloured, becoming slightly darker. There is a white-berried form (*Forma neglecta*, *A. neglecta* Gillman) (plate xvi.), common at Rockliffe, Ottawa, and not rare in other places, which at first



Red Huckleberry.

Photo F. F. Fols.

glance might be taken for *A. alba*, but its long slender green pedicels, unenlarged in maturity, point to a nearer relationship to *A. rubra*. It is found growing in clumps with the red baneberry. Another form of the red baneberry is found in Lincoln county, Ontario, with decompound leaves and incised leaflets, (Var. *dissecta* Britton). The plant is in bloom from April to May, about two weeks before the white baneberry.

DISTRIBUTION: This native plant is common in rich woods from Nova Scotia to Alberta.

POISONOUS PROPERTIES: The berries are known to be poisonous. In regard to the rootstock, Sayre says that it is a violent purgative irritant and emetic.

THE WESTERN RED BANEERRY (*A. arguta* Nutt.)

This plant is similar to the eastern species, but it has very thin and light green leaflets, long pointed and very sharply toothed. Its berries are spherical or almost so, and no doubt possess some of the undesirable qualities of the above species.



MOONSEED FAMILY (*Menispermaceae*)

CANADA MOONSEED (*Menispermum canadense* L.)

PLATE XVII.—FRONTISPIECE.

COMMON NAMES: The Canada moonseed is sometimes called yellow parilla or sarsaparilla, and vine-maple.

DESCRIPTION: One of our most beautiful perennial twining plants, the Canada moonseed is found in the woods bordering streams and lakes, climbing over shrubs in search of higher support or twining around small trees. One of the shrubs about which it delights to twine is the prickly ash (*Zanthoxylum americanum* Mill.). It may sometimes be seen attaining a height of twelve to fifteen feet on large maples, the succession of beautiful green leaves overlapping and forming a graceful covering for the bare trunk. In the summer, the small greenish-white flowers are seen, and in the autumn the rich grape-like clusters of blue berries or drupes. The leaves are heart-shaped, or angled, with three to seven lobes, the stalk set slightly within the margin. The flowers are of two kinds, growing on separate plants, the pollen-bearing or staminate and the seed-bearing or pistillate. The berries each contain one hard seed, which is crescent shaped. The plant blooms from June to July, and the fruit is ripe in September.

DISTRIBUTION: This attractive native vine grows in woods along streams from Western Quebec to Manitoba, and is being introduced by cultivation into other parts of Canada.

POISONOUS PROPERTIES: Canada moonseed is a northern member of a family which chiefly belongs to the tropics and of which many plants contain powerfully toxic principles used as fish poisons. Some species of *Abuta* are used in the preparation of the well-known *curare* poison. For this reason, perhaps, a certain amount of suspicion has naturally fallen upon the moonseed, and it must remain so until more is known of it. The fruit, which ripens about the same time as the wild grape, is always tempting to children and, according to Schnaffner, three fatalities have occurred. The rootstock contains a bitter alkaloid *menispermic*, and *berberine*, as well as the alkaloid *oxyacanthine*.



Canada Moonseed.

Photo F. Fyfe.

BARBERRY FAMILY (*Berberidaceae*)

BLUE COHOSH (*Caulophyllum thalictroides* [L.] Michx.)

PLATE XVIII.

COMMON NAMES: The blue cohosh is also called papoose-root, squaw-root, blue ginseng, yellow ginseng, blueberry-root.

DESCRIPTION: The blue cohosh is a perennial from one to three feet high, with an erect stem bearing a large nearly sessile leaf near the summit and a loose cluster of greenish-purple flowers, which are in full bloom before the leaf has unfolded. The whole plant has a peculiar dark greenish purple bloom when young, which gradually disappears with age. The leaf is twice or thrice compound, the first divisions being long-stalked and the leaflets shorter stalked, oval or oblong, with three to five lobes near the apex. The flowers are about one-half inch wide, surrounded by three to four small bracts. The sepals are six, much longer than the six small and rounded petals. The seeds are globular, resembling dark-blue berries, borne on short, stout stalks. The rootstock is horizontal, thick and knotted, with round pits or leaf scars at intervals, each scar representing a year's growth. It is one of the early spring flowers, blooming from April to May.

DISTRIBUTION: This native Canadian plant is found in the woods from New Brunswick to Manitoba.

POISONOUS PROPERTIES: Blue cohosh contains the poisonous glucosidal *saponine*, a peculiar substance which, when stirred in water, creates a froth like soap suds. The plant is extremely bitter to the taste and is hardly likely to be eaten except by children tempted by the attractive appearance of the berry-like seeds. Lloyd records blue cohosh, in White's book on dermatitis, as being "very irritant to mucous surfaces, so much so that the dust is very disagreeable." The rootstock is said to contain *saponin* and the alkaloid *caulophylline*.

MAY APPLE (*Podophyllum peltatum* L.) BARBERRY FAMILY.

PLATE XIX.

COMMON NAMES: The may apple is recognized by a variety of popular names, of which the most common are mandrake, umbrella-plant, duck's foot, devil's apple, vegetable calomel, wild or ground lemon.

DESCRIPTION: The may apple is a perennial of very striking appearance. A single stem rises from the underground rootstock to a height of a foot or more, when it forks into two large umbrella-like leaves sheltering



Blue Cohosh.

Photo—P. Fyles.

a single nodding white flower in their axil. The leaves are dark green, sometimes a foot across, deeply lobed and notched, with the stalk arising from a point within the margin. The wax-like flower somewhat resembles a single white rose. The fruit is about two inches long, green at first, gradually turning yellow, lemon-shaped, and claimed to be edible, although ill effects have arisen from the consumption of it in any quantity. The rootstock is greatly elongated, with very long spaces between the scars which remain from each year's upper growth. The scars are large, low, and cup-shaped. The plant is in flower during May.

DISTRIBUTION: The may apple is a native of Canada, and is found in the woods or on the borders of woods from Quebec to southern Ontario. In some parts of southern Ontario it grows in great abundance.

POISONOUS PROPERTIES: The same bitterness of the blue cohosh is found in the may apple except in the ripe fruit. The ripe fruit or "lemon" is rather pleasant and sweetish, but one is usually sufficient for the ordinary appetite. Schaffner says, "roots, stem, and leaves drastic and poisonous, but the ripe fruit less so. Leaves, when eaten by cows, produce injurious milk. The ripe fruit may be eaten in small quantities." The rootstock contains a resinous substance to which the name *podophyllin* has been given. *Podophyllin* is used largely for medicinal purposes, and occasionally fatalities have occurred from over-dosage. In relation to the effect of the root upon the skin, Lloyd writes: "Our employees experience great trouble in working this, owing to the irritating action on the skin. We have in numerous instances had our men cease work for several days owing to its action, which causes very painful inflammation of the skin, especially of the eyes."

SYMPTOMS: Millspaugh says in regard to its action on man, the symptoms of disturbance caused by the drug in doses varying from one-quarter to one-half grains of *podophyllin* and in persons working in the dust of the dried root, are substantially as follows: inflammation of the eyes; soreness and pustulation of the nose; salivation and white-coated tongue; extreme nausea, followed by vomiting; severe pains in the transverse colon and abdomen, followed by an urgent call to stool; thin, offensive, copious stools; weak pulse, prostration, drowsiness, and cold extremities.



May Apple.

Photo - F. Fyles.

POPPY FAMILY (*Papaveraceæ*)

BLOODROOT (*Sanguinaria canadensis* L.)

PLATE XX. (Facing p. 52.)

COMMON NAMES: The bloodroot is known by a variety of names, among which are red-indian paint, sweet slumber, redroot, turmeric, and snake-bite.

DESCRIPTION: The bloodroot is one of our earliest and loveliest spring flowers. On its first appearance above ground, the flower bud is entirely surrounded by the grey-green leaf. The upper and smoother side of the leaf is next the flower. The lower side of the leaf is covered with a network of prominent veins. As the leaf unfolds, the flower bud is brought into view. The two pale-green sepals entirely surround the eight white petals in the bud, but when the flower expands, the sepals are no longer needed and fall from the plant. The seed pods are long, narrow, pale-green, and contain shining red-brown seeds. The perennial rootstock is thick, short, dark red on the outside, and brighter red and orange within. When any part of the fresh plant is bruised or broken, there exudes a characteristic reddish juice. The flowers are out in April and May.

DISTRIBUTION: Bloodroot is a native of Canada, and is found in rich open woods from Nova Scotia to Manitoba.

POISONOUS PROPERTIES: The whole plant contains an acrid, orange-red latex or milky juice, which is extremely irritating to the skin, particularly if the skin is bruised or broken. It contains an acrid, bitter substance known as *sanguinarin*. The rootstock also contains the alkaloids *chelerythrine*, *homochelidonine*, and *protopine*. It is hardly likely to be eaten, as it has a repulsive appearance and a very bitter taste. It is used medicinally, and Johnson records fatal cases from overdoses.

SYMPTOMS: Millspaugh states that "Sanguinaria, in toxic doses, causes a train of symptoms showing it to be an irritant; it causes nausea, vomiting, sensations of burning in the mucous membranes whenever it comes in contact with them, faintness, vertigo, and insensibility. It reduces the heart's action and muscular strength, and depresses the nerve force, central and peripheral. Death has occurred from overdoses, after the following sequence of symptoms: violent vomiting, followed by terrible thirst and great burning in the stomach and intestines, accompanied by soreness over the region of these organs; heaviness of the upper chest, with difficult breathing; dilation of the pupils; great muscular prostration; faintness and coldness of the surface, showing that death follows from cardiac paralysis."

CELANDINE (*Chelidonium majus* L.) POPPY FAMILY.

PLATE XXI.

COMMON NAMES: This species is sometimes called the greater celandine to distinguish it from the lesser celandine common in the Old Country. It is also known as the wart-flower, devil's-milk, and swallow-wort.

DESCRIPTION: The celandine is a biennial or perennial herb with deeply-lobed leaves, one to two feet high, so named from an ancient Greek word meaning swallow, because its flowers appear with the coming of the swallows. The whole plant is somewhat brittle, and a saffron-coloured juice oozes out wherever it is broken. The flowers are rather small, bright yellow; sepals two, hairy, falling when the flower expands as is usual in the poppy family; petals four, stamens sixteen to twenty-four. The number two and its multiples is another characteristic of this group of plants. The seed pods are long and narrow, opening from the bottom upwards. Ripe seed pods are often seen with the flowers, as the plant continues blooming from May to September.

DISTRIBUTION: It has been naturalized from Europe and is found in rich, damp soil about towns, chiefly in Ontario.

POISONOUS PROPERTIES:—In reference to the greater celandine, H. C. Long says: "This common plant exhales an unpleasant odour, and when bruised or broken shows the presence of a yellowish acrid juice, which becomes red immediately on exposure to the air. It is an old medicinal drug plant, but is dangerous, being emetic and purgative, with a strongly irritating effect on the digestive tract. Animals are but rarely likely to take it, and no record of the death of domesticated animals has been found." The plant contains the bitter alkaloids *chelidonine*, *chelerythrine*, and *protopine*.

SYMPTOMS: The action of this plant is acrid, irritant and narcotic, emetic and purgative. Esser remarks that when chelerythrine is introduced on the nasal mucous membrane, it causes violent sneezing, and taken internally causes vomiting.



Bloodroot - Plate XVIII.

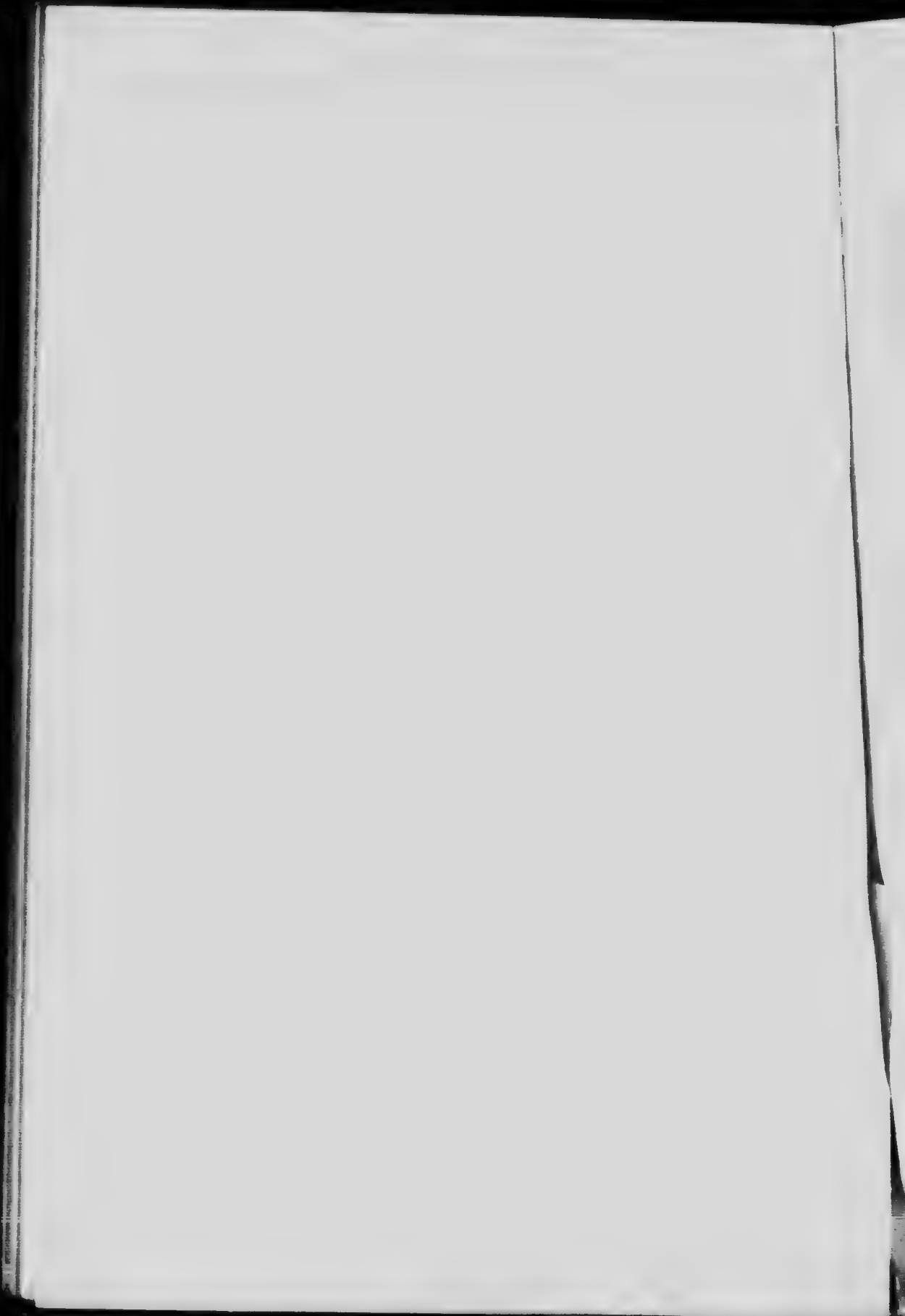


PLATE XXI.



John F. Fyles

Celandine.

PULSE OR PEA FAMILY (*Leguminosae*)

LUPINES (*Lupinus* sp.)

PLATE XXII.

COMMON NAMES: The lupines are known under a variety of names, the most familiar being wild peas, wild beans, blue pea, blue bean, old-maid's bonnets, Quaker-bonnets, and sundial.

DESCRIPTION: Most of the lupines are perennial plants, growing from one to two feet high. The leaves are palmately compound, that is with the leaflets all attached at the end of the leafstalk and outspread. The leaflets vary in number, according to the species, from five to eleven. They also vary in regard to smoothness and hairiness. The flowers are arranged in an elongated spike or raceme. Many of the species are very showy and well worthy of cultivation as ornamental plants. The colour ranges from pink or cream through various shades of violet to rich blues and purples. Each flower is about half an inch long, and there may be any number from fifteen to fifty or more on a single stalk. The seed pod is flattened usually, showing the form of the seed within.

DISTRIBUTION: With the exception of *L. perennis* L. in Ontario, the lupines in Canada are found on the prairies of Saskatchewan and Alberta and on the hillsides and mountains of British Columbia.

POISONOUS PROPERTIES: It was found by Sollman that several poisonous alkaloids were present in the American species of lupine. It is thought probable that most, if not all, of the poisoning of live stock was due to these alkaloids, among which was *lupinidine*, and not to *ictrogen*, the cause of "*lupinosis*" in northern Europe. Marsh and Clawson in their experiments also found the alkaloids to be the cause of trouble. They refer to the work of Knowles, who records lupine poisoning among horses, as the "first to note and record definitely cases which can be diagnosed as instances of "*lupinosis*" or ictrogenic poisoning. The clear-cut evidence presented by Dr. Knowles seems conclusive and makes it probable that other similar cases will be found, although it does not seem likely that lupine causes large losses of horses."

All parts of the lupines above ground are more or less poisonous. The seeds are the most toxic, the pods next, and then the leaves. As the poison is not cumulative fairly large quantities of the plant may be eaten, without harm, provided the toxic limit is not reached at any one time. As the toxic dose is a fairly large one, well-fed animals are not likely to suffer.

ANIMALS AFFECTED: It seems that no domestic animals are immune to the poisonous lupine, but the greatest losses are among sheep.



Lupine

Photo. F. Lips

SYMPTOMS: Marsh and Clawson found that the general symptoms of poisoning by American lupines were distinctly those of alkaloidal poisoning and not of ietrogenic poisoning. The symptoms of poisoning in sheep are heavy and laboured breathing, sometimes frothing at the mouth, a period of coma with snoring. If able to stand, the animal may fall over in its sleep. In acute cases the animal throws itself about violently in its attempts to breathe, followed by violent trembling, convulsions and death. In other cases the coma deepens until the animal dies without a struggle, although the convulsive attacks are the more usual. In the early stages there is drooping of the ears and pushing of the head against surrounding objects. Sheep affected on the range run about in a frenzied manner, butting into other animals and objects. When attempts were made to give remedies, it was found the animals lost more by the increased excitement. In some cases the first symptoms appeared in one or two hours after feeding, in others not till nearly twenty four hours. Death may follow very rapidly or not for a period of two or three days.

REMEDY AND MEANS OF CONTROL: Remedial measures are practically of no use for range animals, but as the lupines are most poisonous when in seed it is possible to manage the flock so as to avoid poisoning.

Seed production should be prevented at any cost. This is best done while the plants are in their first bloom, or even before the opening of the flowers. Continued close cutting will in time kill the roots. In some places the land should be cultivated, where possible, and resown with good fodder plants and grasses.

LOCO WEED. (*Oxytropis Lamberti* Pursh.) PEA. FAMILY.

PLATE XXIII. (Facing p. 60.)

COMMON NAMES: The loco weed or stemless locoweed is known among stockmen as crazy weed, rattleweed, loco-vetch, and white loco.

DESCRIPTION: It is a low silky-haired perennial with tufts of very short stems rising from a thick woody rootstock. The stems are so short that the plant is often described as stemless. The leaves are four to nine inches long, pinnately compound with nine to nineteen leaflets which are longer than wide and pointed. The flower stalks are longer than the leaves, the flowers, half to three-quarters of an inch long, vary in colour from purple and violet to yellow or yellowish-white; they are arranged in dense heads. The seed pods are incompletely two-celled, firm, leathery, and covered with silky hairs. The plants vary greatly as regards hairiness, size, and shape of leaflets, colour of flowers and size of pods. The plant is in bloom from April to August or later, according to locality.

DISTRIBUTION: The loco weed is common on prairies and dry plains from Saskatchewan to British Columbia and the Yukon.

POISONOUS PROPERTIES: The toxic principles of the loco weed have not yet been determined, but its poisonous action upon animals has been fully established in Canada and the United States by field observations.

ANIMALS AFFECTED: Horses, cattle, and sheep may all form what is known as the loco-habit, and succumb sooner or later to its poisonous action. The greatest losses, however, in Western Canada have occurred chiefly among cattle. The word "loco" meaning "crazy", is derived from the Spanish, and is applied in reference to the peculiarities of movement shown by the affected animals.

SYMPTOMS: The general symptoms of poisoning are awkwardness, trembling, loss of control of muscular movement, impaired eyesight and hearing. In extreme cases the animal becomes blind, loses all power of locomotion, refuses food, except loco weed, and dies usually in convulsive spasms.

E. A. Watson (Report Veterinary Director General, Ottawa, 1909) describes the effect upon horses as follows: "Mental derangement and inco-ordinate muscular action form the most constant and characteristic symptoms of the disease. The peculiar gait is at once remarked upon, locomotion being performed slowly and with deliberation, accompanied by overflexion and extension of the limbs. The head is carried low, the arm lifted high, so that the knee and chin are nearly horizontal and in close proximity. The animal appears to be walking over invisible obstacles, and if driven fast will frequently stumble and fall, though the ground be perfectly level. When the condition is very severe, it is almost impossible to force him out of a slow walk; if urged he becomes excited, moving the limbs up and down upon the same spot, "marking time" as it were, or moving forward only a few inches at a step. Visual errors are common. The loss of the sense of direction is well marked. When it is attempted to drive an animal in a particular direction he will tread in semi-circles and run into wire fences or gates. An animal is sometimes unable to locate a dish of oats placed before him, the attempts being often ludicrous."

REMEDY AND MEANS OF CONTROL: Give laxatives and supply good nutritious food. Strychnine has been recommended for cattle, and Fowler's solution for horses.

E. A. Watson says in regard to preventive measures:—"Very little can be advised in the way of medicinal treatment. But if the spread of the disease among healthy animals on a range where the grass and fodder conditions appear excellent can be accounted for by the loco habit largely acquired by imitation, it is obvious that affected animals should at once be removed from the healthy to a range or pasture free from the obnoxious weeds. Healthy animals on the range could be placed in charge of a herder and kept separate from locoed animals. Instances are reported where affected cattle, by early removal to a range free from loco plants, or taken and hand-fed, have so far recovered as to be profitably slaughtered, though such animals are always stunted and undersized."

The loco-weed may be destroyed by cutting off the roots well below the crown, that is at least three inches below the surface of the soil. This should be done with a very heavy sharp and narrow steel hoe when the plants are in flower, or even before, to prevent the scattering of seeds. Plants that have been so cut off will not sprout again, but seeds already in the soil may germinate. By destroying the young plants before they reach maturity, the land will be freed from the weed in a season or two at far less cost than that caused by the death of live stock.



SPURGE FAMILY (*Euphorbiaceæ*)

SUN SPURGE { *Euphorbia Helioscopia* L.
 Tithymalus Helioscopia (L.) Hill }

COMMON NAMES: Among many other English names given to the sun spurge we find wartweed, sunweed, turnsole, churnstaff, cat's-milk, wolf's-milk.

DESCRIPTION: The sun spurge is a smooth annual plant with an erect, stout stem from eight to twelve inches high, often branched from the base. The branches, as well as the main stem, end in a more or less compound umbel which is subtended by a circle of leaflets. The leaves are scattered along the stem; they are somewhat oblong or wedge-shaped, sometimes nearly round, from one-half to four inches long, finely saw-edged, and narrowed to a short stalk. The rather inconspicuous flowers are of two kinds, the staminate and pistillate on the same plant, both included in a cup-shaped involucre resembling a calyx or corolla. The staminate flowers are numerous, lining the inside of the cup, each consisting of one single stamen in the axil of a very little bract. The pistillate flower is solitary in the centre of the cup and consists of a three-lobed, three-celled ovary which soon protrudes on a long stalk and hangs over the brim of the cup-like involucre. The seeds are reddish-brown, strongly honeycombed. The plant is in bloom from June till October.

DISTRIBUTION: Introduced from Europe, the sun spurge has become common in east Quebec and Ontario, and is gradually spreading in Canada.

POISONOUS PROPERTIES: All species of *Euphorbia* or spurge contain a more or less poisonous milky juice, which is very acrid, and in contact with the skin causes extreme irritation, inflammation, vesication, and in some cases gangrene. The poisonous substances have not yet been fully investigated.

In regard to the spurges, H. C. Long says: "The caper spurge (*E. Lathyrus* L.) contains an acrid, emetic, and highly purgative milky juice, and the fruits have commonly been employed by country folk as a purge, and also as a pickle, though they are dangerous and should not be so used. Pratt records a case in which five women ate the pickled fruits with boiled mutton, and all suffered severe pain and burning in the stomach, and showed other symptoms attendant on irritant poisoning—and though all recovered the illness was severe. Used in this manner, indeed, they have given rise to serious cases of human poisoning. Sun spurge (*E. Helioscopia* L.) is similarly poisonous to the preceding species. It has caused fatal poisoning to a boy who ate it. In Germany, cows were poisoned through pasturing in stubble in which the plant was growing, but there were no deaths."

White, in his "*Dermatitis Venenata*," states in regard to the genus: "More than one hundred species of *Euphorbia*, or spurge, grow in the United States, either indigenous or immigrants from Europe. Of every species Loudon says the juice is so acrid as to corrode and ulcerate the body wherever applied; and of *E. resinifera*, from which the official *euphorbium* is obtained, Pliny and Dioscorides, according to the Dispensatory, describe the method of collecting juice, so as to prevent irritation of the hands and face. This substance is used as a plaster to prolong suppuration."

Van Hasselt states that "the juice of several species is used by quacks to remove warts, freckles, as depilatory, etc.; and that the application of the juice, powder, and extract produces not only erysipelatous, pustular and phlegmonous inflammation, but even gangrene. In one case mentioned the whole abdominal wall became the seat of gangrene."

SYMPTOMS: According to Cornevin the spurges have an irritating effect on the mucous membrane, especially at the back of the mouth. In from three-quarters of an hour to two hours after eating the plant, or even longer, there is painful vomiting, followed by diarrhoeic evacuations, with a lowering of the temperature. If the quantity ingested has been sufficient there appear also nervous symptoms, vertigo, delirium, muscular tremors and circulatory troubles which disappear after abundant sweating if the poisoning is not fatal. If it is fatal the symptoms of superpurgation and enteritis predominate, but are accompanied by nervous symptoms and circulatory disorders.

Mueller gives in addition loss of appetite, piteous whining (in goats), groaning, colic, and tympanites; and Pott, bloating, fever, palpitation of the heart, and loss of consciousness; cows gave a reddish or sharp-tasting milk. Milk of affected goats caused diarrhoea in human beings.

REMEDY AND MEANS OF CONTROL: The advice of a physician should be requested. As sun spurge is an annual plant it may be suppressed by preventing the development of the seeds. On cultivated land it should be cut off by the hoe before or as soon as the first flowers appear. Badly infested lands should be put under cultivation, well fertilized, and resown heavily to grass or clover.

CYPRESS SPURGE { *Euphorbia Cyparissias* L.
 Tithymalus Cyparissias (L.) Hill. } SPURGE FAMILY.

COMMON NAMES: This species is also referred to as the balsam-spurge, graveyard-weed, Bonaparte's-crown, tree-moss, quacksalver's-spurge.

DESCRIPTION: The cypress spurge is a bright green, smooth perennial plant with small brownish scales below and numerous narrow green leaves above. Each branch is surmounted by an umbel of many rays, with a



Loco Weed - Plate XXIII

circle of linear leaves subtending it. The flowers are small, each protected by large heart-shaped, yellow bracts. The plant is in bloom from May to September.

DISTRIBUTION: This species has also been introduced into Canada from Europe, and has escaped from gardens to roadsides and waste places.

POISONOUS PROPERTIES: The whole plant is similarly poisonous to the preceding species. The milky juice irritates the skin and raises blisters, and sometimes causes serious inflammation. Cattle avoid the plant, but have been accidentally poisoned by drinking from water into which it had been thrown.

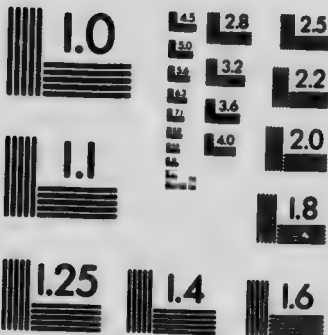
REMEDY AND MEANS OF CONTROL: Small patches of this weed should be grubbed out and the rootstocks destroyed by the application of hot brine or caustic soda. On larger areas, close cutting when the plants are in full bloom will in time starve the rootstocks.





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CASHEW FAMILY (*Anacardiaceæ*)

POISON IVY (*Rhus Toxicodendron* L.) (*Toxicodendron Toxicodendron* (L.) Brit.)

PLATE XXIV.

COMMON NAMES:—Poison-ivy is also recognized under the names poison-oak, poison-vine and three-leaved ivy.

DESCRIPTION:—Poison-ivy is a low shrub which is propagated by under-ground branches as well as by seeds. It scrambles over stumps of trees or, as in the case of the variety *radicans*, it climbs by means of aerial rootlets to some height up fence posts and the trunks of trees. The long stalked leaves are divided into three distinct leaflets, which are mostly ovate, pointed, entire or with a few irregular coarse teeth, bright green above, paler and slightly hairy beneath, changing to rich autumnal colours. The flowers are small, inconspicuous, greenish or whitish, loosely clustered in the axils of the leaves. As the flower cluster is surpassed by the long-stalked leaves it is seldom seen unless the foliage is moved aside. The berries are greenish-white or cream coloured, slightly shining, round, smooth, with longitudinal ridges at intervals. The flowers are in bloom from April till June.

DISTRIBUTION:—It is a native of Canada and is commonly found in hedgerows, thickets and dry woods from Nova Scotia to British Columbia, where it passes into a thicker-leaved and smoother form (*R. Rydbergii* Small).

POISONOUS PROPERTIES:—Poison ivy is the worst vegetable skin poison in America, hundreds of people being poisoned each year. The poisonous constituents have not yet been satisfactorily determined. Cases of poisoning are often reported where the individual has passed the plant without coming in contact with it. This has been explained by the fact that pollen grains, minute hairs and even exhalations from the plant are sufficient to cause eruptions on the skin of a susceptible person. The poison may even be carried on the clothing or tools of someone who has been in contact with it, or it may be that, as the effect of the poison does not appear for some time, the occasion of coming in contact with it may have been quite forgotten. On the other hand, many people handle it frequently with no ill effect.

Cattle can eat it with impunity, but dogs are poisoned by it.

SYMPTOMS:—Inflammation of the skin begins to appear from eighteen hours to several days after contamination, and is characterized by intense irritation and burning, swelling and redness, followed by blisters and pain. Symptoms of internal poisoning are burning thirst, nausea, faintness, delirium, and convulsions.



Poison Ivy.

Photo—P. Fyles.

REMEDY AND MEANS OF CONTROL:—Many remedies have been suggested to allay this burning and irritation, one of the simplest being the immediate washing of the parts affected with good strong yellow laundry soap. On return from a day's outing where there was danger of meeting with poison-ivy, the liberal use of such a soap might prevent much suffering, a piece might even be carried in the pocket.

An application of absorbent cotton saturated with a solution of common baking soda is simple and efficacious. In the case of severe poisoning the aid of a physician should be obtained.

To properly eradicate this pest the underground root stocks must be destroyed as well as the flowering tops. Grubbing out and burning it by some one who is immune to the poison is the surest means. Spraying with hot brine, or caustic soda will kill it. One pound of caustic soda to two gallons of water has been found most effective.

POISON SUMACH (*Rhus Vernix* L.) (*Toxicodendron Vernix* (L.) Kuntze)
CASHEW FAMILY.

COMMON NAMES:—The poison sumach is also well known as the swamp-sumac. It is erroneously called poison elder and poison dogwood.

DESCRIPTION:—The poison sumach is a shrub or small tree from six to twenty feet high with long pinnate leaves bearing seven to thirteen leaflets. The leaflets are about two to four inches long and from one to one and a half inches wide, green on both sides, with reddish stalks and midribs. The margins are entire. The flowers are small, green, in long, loose, open, slender panicles. The fruit is smooth, round, greenish or dun coloured. The shrub is very attractive in the autumn, when the leaves change to very brilliant shades of scarlet and orange. The flowers are out in June.

The harmless sumacs may be very readily distinguished by their *red* fruits.

DISTRIBUTION:—It is a native of Canada, and is found on low wet ground and in swamps, in Ontario.

POISONOUS PROPERTIES:—Similar to the poison-ivy, but even more dangerous. Fortunately this species is not very common in Canada.

MEZEREUM FAMILY (*Thymelaeaceae*)

WICOPY (*Dirca palustris* L.)

PLATE XXV.

COMMON NAMES:—This plant, so useful to the North American Indians, retains some of their original names, as leatherwood, moosewood, swampwood, rope-bark.

DESCRIPTION:—The wicopy is a much-branched shrub from two to six feet high, with smooth, jointed, yellowish-green twigs and tough fibrous bark. Like the mezereon, it produces its small clustered flowers very early in the spring before the leaves have expanded. The calyx is petal-like, pale yellow, tubular, with a wavy or slightly four-toothed margin showing the protruding stamens and style. The flowers grow in clusters of three or four and are protected from cold winds by dark hairy scales which look like folds of fur around the silky yellow calyces. There is no mistaking it when in flower, especially as it is one of the earliest shrubs to bloom. The leaves are oval, two to three inches long, alternate and very short-stalked. The reddish, oval drupe is about one-half inch long. The plant is in bloom in April.

DISTRIBUTION:—It is a native of Canada and grows in damp, rich woods from New Brunswick to Ontario.

POISONOUS PROPERTIES:—The bark contains poisonous properties similar to its relative mezereon (which see) and, when fresh, causes severe irritation to the skin, followed by blisters. All parts of the plant have a burning, nauseous taste. The poison is most powerful during flowering and fruiting.

MEZEREON (*Daphne mezereum* L.) MEZEREUM FAMILY.

COMMON NAMES:—The popular names by which this poisonous plant is known include spurge-laurel, lady-laurel, paradise plant, mystery-plant, and dwarf bay.

DESCRIPTION:—The mezereon is a small shrub from one to four feet high. It begins in early spring before the leaves are out, strongly sweet-scented, rose-purple flowers clustered on the shoots of the preceding year. As it has no corolla, the brightly coloured, tubular calyx, with its four sepals outspread, lends attraction to its flowers. The leaves are long, narrow, tapering into short stalks. The fruit is a one-seeded berry or drupe, oval, one-quarter to one-third inch long, bright red. The plant is in bloom from April to May.



Wicopy.

Photo—F. Fyles.

DISTRIBUTION:—It is found in waste places and pastures where it has escaped from cultivation. It is locally established in Nova Scotia, western Quebec and Ontario.

POISONOUS PROPERTIES:—All parts of mezereon are acrid and poisonous, especially the bark and berries. They contain an extremely acrid resin *mezerein*, a bitter poisonous glucoside *daphnin*, as well as a vesicating fatty oil. The bark has a persistent burning taste, and when freshly applied to the skin produces inflammation and blistering. As a rule animals reject the plant on account of its bitter taste. The abundant bright scarlet berries are very tempting to children. A fatal case of poisoning was lately reported from Nova Scotia. The following from Anne Pratt's book will show that fatalities were not rare in the Old Country.

"Death has resulted from eating but a few of these berries; and Dr. Christison relates a case of a child in Edinburgh who died from eating them, while another is recorded by Linnaeus of a young lady to whom twelve of the berries were given as a medicine in intermittent fever, and who soon died in consequence of their corrosive poison. Four berries produced thirst, sense of heat in the mouth and throat, and also fever, in a man who ate them, and they are proved to be poisonous to dogs and foxes."

Even one berry chewed but not swallowed will produce intense burning in the throat and mouth, which lasts for several hours. Drying does not destroy the potent poison of this plant.

SYMPTOMS:—H. C. Long says:—

"The *Daphnes* are severely purgative, cause burning in the mouth and throat, and in severe cases have narcotic effects and give rise to convulsions. Lauder gives the symptoms as intense colic, constipation, followed by dysentery and copious evacuations of faeces streaked with mucus, blood and intestinal epithelium. Drowsiness between the spasms. According to Mueller there is inflammation of the stomach and intestines (with colic, vomiting, severe diarrhoea, passing of blood), inflammation of the kidneys (with strangury, bloody urination), and in many cases nervous symptoms (weakness, giddiness, and convulsions).

In a case observed by Lander, in the horse, there was abdominal pain, staggering gait, anxious countenance, laboured breathing, pulse 80, temperature 103.2° F., bowels normal. On the following day there was excessive purgation, pulse 120, temperature 104.2° F., and death occurred at mid-day."

REMEDY:—In the case of human poisoning an emetic may be given, followed by a soothing drink such as rice water, barley water, iced-milk, or white of egg beaten up in cold water while waiting for medical advice, which should be promptly summoned.

PARSLEY OR CARROT FAMILY (*Umbelliferae*)

POISON HEMLOCK (*Conium maculatum* L.)

PLATE XXVI.

COMMON NAMES:—This plant, known from early days as hemlock or wild hemlock, has a number of other common names, a few of which are snakeweed, spotted parsley, poison-root, wode-whistle.

DESCRIPTION:—An erect, much-branched biennial with round, smooth, hollow stems from two to six feet high, covered with purplish spots which usually disappear on drying. The leaves are large, shining, decompose, with finely-cut leaflets, which have a very foetid and characteristic mousy odour when crushed. The leaves are much more delicate in outline than those of the water hemlock (cf. illustrations), the ultimate segments ending in a small, colourless, bristle-tip. The flowers are small, white, in large loose umbels, with a circle of bracts or small leaves at the base of the umbels. The fruit or "seed" clusters, as they are popularly called, are conspicuous in late summer and autumn. Each fruit is composed of two parts, so close together as to resemble one round seed, somewhat flattened on each side, with wavy ridges running from top to bottom. Each part contains one seed, which is deeply grooved on the inner face. The root is from eight to ten inches long and about one inch in diameter, tapering, sometimes forked. It smells very much like the parsnip. The plant is in bloom from June to August.

DISTRIBUTION:—Naturalized from Europe, the poison hemlock is found in waste places, chiefly on dry ground from Nova Scotia to Ontario, also in British Columbia.

POISONOUS PROPERTIES:—It is a question as to which part of the plant is most poisonous, since authorities differ, but, as fatalities have resulted from the consumption of even a very small portion of the leaves or seeds or roots, it may well be said that the whole plant is deadly. It seems that early in the summer the poisonous properties are most abundant in the green leaves, and that later on the seeds are the most toxic, particularly just before ripening. As the poisons are volatile the plant loses its toxicity on drying, and consequently is not so dangerous to animals when dried with the hay. The seeds, however, are most poisonous when fully formed but still green in colour. When fully ripened their toxicity gradually diminishes.

The plant contains the very poisonous alkaloid *coniine*, a colourless liquid which gives the plant the characteristic, disagreeable, mousy odour. The poisonous *coniceine* and the alkaloid *methyl-coniine* are also present, as well as other substances. Greenish states, "Hemlock herb contains *coniine* and *conhydrine*. These alkaloids are present in both stem and



Poison Hemlock.

Photo—F. Fyles.

leaves in largest quantity when the plant is in full flower." After flowering the alkaloids pass to the fruits and become concentrated in the partially ripened seed.

ANIMALS AFFECTED:—Many cases of poisoning of domestic animals have been reported from the United States. The plant is evidently most injurious to stock early in the season, when its foliage is fresh and other herbage is scarce.

HUMAN POISONING:—Poison hemlock is very well known historically as a plant of evil reputation. It was in all probability the plant used by the Greeks in the preparation of their poisonous draughts, and by which Socrates, Phocion, and others met their death. Fatalities have also occurred by mistaking the plant for some edible species. An old English herbalist says, "If any, through mistake, eat the herb hemlock instead of parsley, or the root instead of parsnip, both of which is very likely, whereby happeneth a kind of perturbation of the senses, as if they were stupid and drunk, the remedy is, as Pliny saith, to drink of the best and strongest pure wine, before it strikes to the heart, or gentian put in wine."

The seeds have also been used in error for those of anise. Small boys have been poisoned by making whistles out of the hollow stems of the plant.

SYMPTOMS: Hemlock has long been recognized as a very dangerous narcotic plant. H. C. Long says, "Even the smallest quantities may cause inflammation of the digestive organs, paralysis, and death." The general symptoms, as given by Long, are salivation, bloating, dilation of pupils, rolling of eyes, laboured respiration, diminished frequency of breathing, irregular heart action, loss of sensation, convulsions, uncertain gait, falling, and, at the end, complete paralysis. Death occurs after a few hours. The poison acts on the motor nerve endings, causing paralysis, dyspnoea resulting from paralysis of the pectoral nerves, and acceleration of the heart from that of the inhibitory fibres of the pneumogastric.

Small quantities cause in the horse a little prostration, yawning, acceleration of pulse, dilation of pupils, and sometimes muscular spasms of the neck and shoulders. Large quantities cause nausea, unsuccessful attempts to vomit, gritting of teeth, accelerated respiration and dyspnoea, and muscular tremors commencing in posterior members and spreading to anterior members and spine. There is next difficulty of locomotion, sweating (but not continual), falling, paraplegia, then paralysis, loss of feeling, lowering of temperature, rapid pulse, increasingly difficult respiration, and death from stoppage of respiration.

With cattle there is excessive salivation, cessation of digestion, bloating, constipation, weakness, and stupor. The milk of cows who have eaten the weed has a disagreeable taste. Chesnut says in cows there is "loss of appetite, salivation, bloating, much bodily pain, loss of muscular power, and rapid, feeble pulse."

H. C. Long states that in *sheep* the abdomen is tucked up, the animal has a dazed appearance, there is dilation of pupils, unsteady gait, the hind limbs being dragged, coldness, and death after a few convulsive movements.

In the *pig* there is prostration and inability to move, coldness, slow breathing, livid mucous membranes, imperceptible pulse, paralysis, particularly of the posterior members, and no convulsions.

REMEDY AND MEANS OF CONTROL: In the event of poisoning, professional advice must be promptly summoned. While waiting for assistance the system should be relieved of the poison as soon as possible by use of an emetic. Stimulants may then be given, and warmth applied to the extremities. This weed should not be allowed to stand on any farm or roadside. It should be grubbed out and promptly destroyed. In no case should it be allowed to go to seed.

WATER HEMLOCK (*Cicuta maculata* L.) CARROT FAMILY.

PLATE XXVII.

COMMON NAMES: Other significant names given to this plant are beaver-poison, spotted cowbane, musquash-root, snakeweed, and children's-bane.

DESCRIPTION: The water hemlock is a tall perennial herb from three to six feet in height. The stem is stout and streaked with purple. The leaves are compound, but not so finely divided as in the poison hemlock (cf. illustrations). The leaflets are saw-toothed. The small white flowers are arranged in a compound umbel with *no bracts at the base of the main umbel*. There are slender bracts at the base of each lesser umbel or umbellet. The fruit is oval, with *no groove on the inner face of the seed*. The roots are several, fleshy, in the form of oblong tubers clustered at the base of the stem. If the base of the stem is cut lengthwise, a number of *transverse partitions* will be seen in greater or less contiguity according to the time of year and growth. The plant is in bloom from June to August.

DISTRIBUTION: Water hemlock, unlike poison hemlock, is found in *wet* places, in swamps, low ground, and along streams. Native of Canada, it is common from New Brunswick to British Columbia.

POISONOUS PROPERTIES: Of all the poisonous plants in Canada, the water hemlocks are the most deadly and act most rapidly. All species of *cicuta* are exceedingly poisonous both to human beings and animals. Although there is some difference of opinion as to the amount of toxicity in the upper portion of the plant, yet all agree the roots and swollen base of the stem are the most virulent. They are usually eaten by animals early in the season, when they offer an abundant green fodder. As they grow on wet, soft land, the roots are easily pulled up by stock when eating the herbage. The toxic principles are the alkaloid *cicutine*, with *oil of cicuta* and *cicutoxine*, a bitter resinous substance.



Water Hemlock.

Photo—F. Pyle.

ANIMALS AFFECTED: No animals appear to be immune to the poisonous effect of this plant. Cattle and sheep, however, suffer most, as in grazing they pull the roots up and eat them as well. Hedrick says that a piece of root the size of a walnut was found by experiment to be sufficient to kill a cow. Death may occur in fifteen minutes, or the intense suffering may continue from two to several hours before death. One of our correspondents from Alberta writes: "These are the plants (*C. vagans*) that killed the cattle in that neighbourhood, and the cattle would eat them and gnaw a hole in the ground like a bowl to get the roots, and then die right there. There were the bones of some of the cattle poisoned last year within ten feet of where these plants that I am sending you were growing."

HUMAN POISONING: Cases of human poisoning are too numerous and too widespread to mention in detail. Different parts of the water hemlock have been eaten by mistake for edible plants, the roots especially being often mistaken for artichokes or sweet potatoes. The tubers are especially tempting to children on account of their sweetish taste.

SYMPTOMS: The first symptoms usually occur within two hours after eating the plant. There is nervousness, twitching of the muscles of the mouth and ears, salivation, sometimes nausea and vomiting, bloating, intense pain, frenzied movements, dilated pupils, spasms and convulsions, frothing at the mouth and nose, twisting the head and neck backwards, rolling of the eyeballs. The victim usually dies in the most violent spasms.

BULBOUS WATER HEMLOCK (*Cicuta bulbifera* L.) CARROT FAMILY.

PLATE XXVIII.

DESCRIPTION:—The bulbous water hemlock is a slender perennial plant, much branched, growing from one to three feet high. The leaves are divided two or three times into narrow, saw-toothed leaflets. The upper leaves are less divided and bear small clustered bulblets in the angles formed by the leaf and stem. The white flower clusters are arranged in umbels similar to those of the other water hemlocks. The roots also are similar but seldom as large. It is in bloom from July to September.

DISTRIBUTION:—It is found in swamps and wet places from Nova Scotia to British Columbia.

POISONOUS PROPERTIES:—This species and also the Western Water Hemlock (*Cicuta vagans* Greene) of British Columbia, contain the same poisonous principles as the preceding species and are equally dangerous to all stock. Plate XXIX.

REMEDY AND MEANS OF CONTROL:—The poisonous substance of the water hemlocks is so rapid in its action that little or nothing can be done



Bulbous Water Hemlock.

Photo—F. Pyles.

PLATE XXIX.



Indo-F. Pyla.

Western Water Hemlock.

in the way of remedial treatment. When poisoning has been discovered the animals are either dead or dying or in such excitement that any attempt at treatment tends to hasten death.

In the case of human poisoning an emetic may be given at once and a physician summoned.

All plants should be grubbed out and destroyed, or they may be readily pulled by hand in the spring when the ground is soft. On large areas where grubbing out seems impossible, the land should not be used as a pasture.

WATER PARSNIP (*Sium cicutaefolium* Schrank) CARROT FAMILY.

PLATE XXX.

COMMON NAMES:—This plant is also known as the hemlock water-parsnip.

DESCRIPTION:—The water parsnip is an erect, stout, branched perennial herb from two to six feet high. The lower leaves are long-stalked and the uppermost are nearly sessile. Sometimes a few of the lower leaves are submersed and finely dissected, but in general the leaflets are undivided, one and one-half to five inches long, narrow, sharply pointed and saw-edged. The umbels and umbellets of small white flowers are subtended by numerous narrow bracts. The fruit is oval and prominently ridged. It is in bloom from July to October.

DISTRIBUTION:—The water parsnip is a native of Canada. It is common in low, marshy land, swamps, and on muddy banks, across the continent.

POISONOUS PROPERTIES:—This plant has long been held as suspicious and it has been reported as "antiscorbutic, diuretic and poisonous" by Hyams of North Carolina. Pammel says it has been reported as poisonous from several different sources. As far as is known the toxic principles have not been investigated, but there is no doubt that it is poisonous.

One of our correspondents in Ontario recently lost several head of cattle from eating water parsnip. In writing of the effect of this plant upon his cows, he says: "It seemed to affect the kidneys and back. First their water was red, then turned black as ink. They seemed to dry up. They did not bloat at all. Their milk dried up the first day." A similar case was reported from Saskatchewan.



Water Parsnip.

Photo—F. Fyles.

HEATH FAMILY (*Ericaceæ*)

MOUNTAIN LAUREL (*Kalmia latifolia* L.)

COMMON NAMES:—The most familiar of the English names are broad-leaved laurel, poison-laurel, sheep-laurel, spoonwood, calico-bush.

DESCRIPTION:—The mountain laurel is one of our most attractive shrubs usually from three to six feet high, but in the Southern States it sometimes attains a height of thirty or forty feet. Its leaves are bright green on both sides, thick, with short stalks, flat and shining, oval, pointed at each end, entire. It has beautiful clusters of showy pink flowers with clammy stalks. The seed-capsule is round, hard, dry, clammy and many-seeded. The plant is in bloom from May to July.

DISTRIBUTION:—This native plant is found on rocky hills, pastures and mountain slopes from New Brunswick to Ontario.

POISONOUS PROPERTIES:—B. S. Barton (1798) says:—

"Nearly allied to the *Rhododendron* is the genus *Kalmia*. Of this we have several species, and all of them are poisons. The *Kalmia Latifolia*, or broad-leaved laurel, is best known to us. It kills sheep and other animals. Our Indians sometimes use a decoction of it to destroy themselves."

All parts of the plant except the wood contain the very poisonous constituent *andromedotoxin*. Many cattle and sheep are poisoned annually by it. Poisoning usually takes place in the spring when the animals, after the dry food of winter, are attracted by its evergreen foliage. Cases of human poisoning have been known from eating the honey from the flowers, or chewing the leaves in mistake for wintergreen. (Chestnut).

SYMPTOMS: The general symptoms as given by Chesnut for sheep, cows, and goats, are as follows:—

"Persistent nausea, with slight but long-continued vomiting and attempts to vomit, frothing at mouth, grating of teeth, irregular breathing, partial or complete loss of sight and feeling, dizziness, inability to stand, extreme drowsiness, coma and death" * * * "In addition to most of the above effects, there is, in man, severe pain in the head, an increased tendency to perspire, and often a peculiar tingling sensation in the skin throughout the entire body."

SHEEP LAUREL (*Kalmia angustifolia* L.)

COMMON NAMES: Sheep-laurel is also called lambkill, sheep-poison, wicky, kill-kill, calf-kill.

DESCRIPTION: The sheep laurel differs from the mountain laurel in its lower stature, in its somewhat narrower leaves, which are commonly

opposite or in threes and *pale* beneath, and in its *crimson* flowers, which appear later than the fresh green shoots of the season. It is in bloom from June to July.

DISTRIBUTION: This species is also native, and is found on hillsides, pastures, and in bogs from Newfoundland, Labrador, to Ontario, and on the Hudson bay.

POISONOUS PROPERTIES: Of an intensive poisonous nature similar to the mountain laurel. No doubt, other species of *Kalmia*, including the swamp or pale laurel (*Kalmia polifolia* Wang.), are equally injurious.



DOGBANE FAMILY (*Apocynaceæ*)

SPREADING DOGBANE (*Apocynum androsaemifolium* L.)

PLATE XXXI.

COMMON NAMES: The spreading dogbane is also called honey-bloom, bitter root, wandering milkweed, wild ipecac, rheumatism-weed.

DESCRIPTION: The spreading dogbane is a perennial herb from two to three feet high, rich in milk-sap, with a smooth stem usually red on one side and with spreading branches. The leaves are opposite, short-stalked, oval, acute, entire, two to three inches long. The flowers are small, *pale rose*, somewhat striped, open bell-shaped, in loose cymes, the *corolla tube much longer than the calyx*, with spreading lobes, sweet-scented towards evening. The fruit consists of two slender pods, four to six inches long. The seeds are numerous, with a tuft of white silky down at one end. The plant is in bloom during June and July.

DISTRIBUTION: It is found commonly in fields and thickets, and open woods from Anticosti to British Columbia.

POISONOUS PROPERTIES: See the following species.

BLACK INDIAN HEMP (*Apocynum cannabinum* L.) DOGBANE FAMILY.

COMMON NAMES: This species is known also as wild cotton, rheumatism-root, amy-root.

DESCRIPTION: The flowers of this species differ from the above in being greenish-white, without perfume. The corolla lobes are ascending and not longer than the calyx lobes. The seeds are slightly longer. The black Indian hemp has a strong, tough fibre, at the same time fine and soft, which is used by the North American Indians in making bags, baskets, belts, fishing lines and nets. Both species are generally distributed across the continent, but are seldom found in close proximity.

POISONOUS PROPERTIES: Both the spreading dogbane and the black Indian hemp are said to be poisonous to live stock. As a rule the plants are not enticing to stock as they have tough stems, but in the early summer, when the stalks are tender and succulent and in those places where the plant is abundant and more wholesome vegetation is lacking, animals are tempted to eat the young green shoots.

The black Indian hemp contains the poisonous glucoside *apocynin*, as well as the glucoside *apocynein*.



Spreading Dogbane.

Photo—F. Fyles.

MILKWEED FAMILY (*Asclepiadaceæ*)

BUTTERFLY-WEED (*Asclepias tuberosa* L.)

COMMON NAMES: The butterfly-weed is also known by the names pleurisy-root, orange-root, Canada-root, orange swallow-wort, yellow milkweed, Indian-posy, silk-weed.

DESCRIPTION: The butterfly-weed is an erect, stout, perennial herb. The stem is simple or branched near the top, hairy, very leafy, from one to two feet high. The leaves are alternate, oblong, pointed or sometimes rounded at the apex, very short-stalked or without stalks, two to six inches long. The greenish-orange flowers are arranged in terminal umbels, the stalks of which are shorter than the leaves. The seed-pods, or follicles, are very striking and characteristic of all the milkweeds. They are from four to five inches long and one to one and a half inches wide in the middle, tapering at both ends, and covered with fine hairs. The numerous seeds are flat, reddish-brown, with a long tuft of fine silky down. They may be seen in the autumn and early winter escaping from the partially opened pod and being blown some distance by the wind. The handsome orange flowers are in bloom from June to September.

DISTRIBUTION: Native to Canada, it is found on dry fields and banks, chiefly in the province of Ontario.

POISONOUS PROPERTIES: The leaves and stem are poisonous. They contain the amorphous, bitter glucoside *asclepiadin*. Horses and cattle avoid eating the plant, but sheep are sometimes poisoned when driven over dry districts where other herbage is scarce.

OTHER SPECIES OF MILKWEED IN CANADA.

PLATE XXXII.

The swamp milkweed (*A. incarnata* L.); the common milkweed (*A. syriaca* L.), the showy milkweed (*A. speciosa* Torr.), and the oval-leaved milkweed (*A. ovalifolia* Dec.), all natives of Canada and similar in general appearance to the butterflyweed but with opposite leaves, which is the usual arrangement with most of the milkweeds, are said to be more or less poisonous and must be viewed with suspicion until more is known of them.



Swamp Milkweed.

Photo—P. Fyles.

MINT FAMILY (*Labiatae*)

GROUND IVY (*Nepeta hederacea* (L.) Trev.) (*Glechoma hederacea* L.).

PLATE XXXIII.

COMMON NAMES : Ground ivy is also known by the following English names: Gill-over-the-ground, haymaids, creeping charlie, robin-run-away, hedge maids.

DESCRIPTION : Ground ivy is a low, creeping and trailing, hairy, perennial herb, with round, scalloped leaves, green on both sides, one to two inches wide, their short stalks placed opposite one another on the square stem. The light blue corolla is three times the length of the hairy calyx. The whole flower is only about half an inch long and not so wide. The plant is in bloom from April until May or June.

DISTRIBUTION :—It has been introduced from Europe and is common in waste places, on damp or shady ground about doorways and neglected gardens. In the East it is found from Newfoundland to Ontario. It is common in British Columbia.

POISONOUS PROPERTIES : Like the catnip (*N. Cataria* L.) ground ivy contains a volatile oil and bitter principle.

ANIMALS AFFECTED : A fatal case (1915) of the poisoning of two horses was reported to us from Prince Edward Island. The horses ate the weed early in November when it afforded an abundance of fresh green in contrast to the surrounding herbage. Our correspondent says: "The horses panted continually. One lived for five days, the other eight days. One would lie down occasionally, the other would not lie down. One ate the plant till it died, the other refused to eat anything."

H. C. Long quotes a case which came before the Board of Agriculture and Fisheries (England) in 1906, in which three horses became ill with symptoms of poisoning, and the "only weed found in the lucerne they were getting was ground-ivy, and this was suspected but not proved to be the cause. In a further case, reported in 1909, eleven horses were believed to have been poisoned by this weed, and in one of the dead horses scarcely any food but ground-ivy was found, and to it the veterinary surgeon in attendance attributed death."

J. Ferenchazy (1914) reports a case of poisoning of nine horses, and states that ground ivy "has occasioned no trouble in cattle and sheep that consumed it."

SYMPTOM : The symptoms of poisoning in horses as given by Ferenchazy are "anxious look, dyspnoea, salivation, sweating, dilation of the pupils, cyanosis, signs of pulmonary oedema."

REMEDY AND MEANS OF CONTROL : On small patches the tops of the plant may be easily raked off and destroyed. A shallow layer of the soil may then be overturned to expose the numerous creeping rootstocks in hot dry weather. The weed does not long persist on well-cultivated land.

PLATE XXXIII.



Lycium F. Fylos

Ground Ivy.

NIGHTSHADE OR POTATO FAMILY (*Solanaceae*)

BITTERSWEET (*Solanum Dulcamara* L.)

PLATE XXXIV.

COMMON NAMES: This species of *Solanum* is sometimes called the woody nightshade, bittersweet-nightshade, scarlet berry, violet bloom and fever-twig.

DESCRIPTION: The bittersweet is a climbing, somewhat woody and hairy perennial, three to seven feet high, with thin green leaves paler on the underside. The leaves are stalked, heart-shaped, the upper with two ear-like lobes at the base. The flowers are loosely clustered, rich purple with bright yellow stamens arranged in a cone at the centre. The berries, which give the plant a very attractive appearance in the autumn, are bright scarlet when ripe. Often on the same cluster of fruit, bright green, pale yellow, orange, and scarlet berries are seen. The seeds are round, flat, and yellow. The plant is in bloom from June to September.

DISTRIBUTION: Introduced from Europe, it is now rather common in Canada from New Brunswick to Ontario, chiefly found on moist woody banks, borders of streams, and around dwellings. It also occurs in British Columbia.

POISONOUS PROPERTIES: The stems, leaves, and berries contain the alkaloid *solanine*. The stems contain, as well, the glucoside *dulcamarin* which gives the plant its peculiar bitter-sweet taste, and which has not yet been fully investigated. The degree of toxicity of the plant has not been determined; no doubt it varies under certain conditions. Chesnut says, "Besides *solanin* (0.3 per cent) this plant contains another less poisonous compound, *dulcamarin* . . . Neither of the compounds is abundant. The berry, though its taste is not remarkably disagreeable, is somewhat poisonous, and it has been shown that an extract of the leaves is moderately so. The plant has nevertheless caused some ill effect." Schimpfky reports that the berries have been used to poison dogs, and the juice of the fruit acts as a poison to rabbits.

ANIMALS AFFECTED: Bittersweet, under ordinary conditions, is hardly likely to be eaten by stock. Gillam, however, records (Veterinary Record, 1906) a case of poisoning of sheep.

SYMPTOMS: In the case of sheep poisoning reported by Gillam, the symptoms given were, small, intermittent pulse, temperature 104° F., quickened respiration, staggering gait, dilated pupil, and greenish diarrhoea.

REMEDY AND MEANS OF CONTROL: About thickets and on the edges of woods where children are likely to be attracted by its crimson fruit, the plant should be cut off when in flower, caustic soda or hot brine should

PLATE XXIV.



Solanum...

Solanum...

be poured upon the roots to check new growth and in time kill the shrub. Young plants may be readily handpulled. Older roots should be grubbed out.

THREE-FLOWERED NIGHTSHADE (*Solanum triflorum* Nutt.)

NIGHTSHADE OR POTATO FAMILY.

COMMON NAMES: This species is also called the spreading or prairie nightshade, the cut-leaved nightshade, and wild tomato.

DESCRIPTION: The three-flowered nightshade is a low spreading annual, widely branching, sometimes forming a heavy flat mat from one to two feet in diameter. The leaves are oblong, with seven to nine lobes. The white flowers are arranged in groups of three. The berries are nearly twice the size of the following species, being one-half inch, or more, in diameter. They retain their green colour even when ripe. They are usually in groups of three. The plant blooms from July to September.

DISTRIBUTION: This native plant is found as a garden weed in Eastern Canada. It is becoming common on the prairies from Manitoba to Alberta.

POISONOUS PROPERTIES: The poisonous principle of this species has not yet been determined, but it is probably similar to the preceding. Experiments carried on by Chesnut proved that the berries were poisonous to guinea pigs. Chesnut and Wilcox say, "A single complaint of the poisoning of cattle by the fruit was sent to this department from Nebraska, and rabbits inoculated with the juice of the berries from that State were badly poisoned."

COMMON NIGHTSHADE (*Solanum nigrum* L.) NIGHTSHADE OR POTATO FAMILY.

PLATE XXXV.

COMMON NAMES: The common nightshade, equally well known as the black nightshade, is also sometimes referred to as stubble-berry, deadly, and garden nightshade.

DESCRIPTION: The common nightshade is a low, nearly smooth, much branched, and often spreading, annual plant from one to two feet high. The stems are somewhat rough-angled. The leaves are oval, tapering, two to four inches long, with few-toothed or wavy margins. The flowers are small, white, star-shaped, in drooping clusters of two to five. The berries are round, black when ripe. The plant blooms from July to September, and in the middle of the summer it is quite a common thing to find all stages of ripening fruit from pale green to black, as well as freshly opened flowers, all on the same plant.



Common Nightshade.

Photo. F. Fyles.

DISTRIBUTION: It is widely distributed throughout the world except in extreme north and south. In Canada it is found on shaded as well as open ground from coast to coast.

POISONOUS PROPERTIES: There seems to be no doubt that this plant must be regarded as poisonous, but under certain conditions of soil and climate the toxicity evidently varies. Thus we read that, the "berries have been used instead of raisins for plum puddings, with no effects out of the ordinary" (Ewart), and again "Children have been poisoned by the berries, but may on occasion eat them with no other ill effect than a stomach ache, or, if eaten in excess, sickness and purging" (H. C. Long). Chesnut says: "The amount of poison present in any part of this plant varies with the conditions of growth. The more musky-odoured plants are the most poisonous. In some, the amount of alkaloid in the ripe fruit and leaves is so small that these parts may be, and are, consumed in considerable quantity without any ill consequences. Poisoning does sometimes follow, but it is not clear whether this is due to improper preparation or to careless selection of the parts used. The use of black nightshade for food is certainly not to be recommended."

The common nightshade contains the alkaloid *solanine*, which is found in larger quantities in the partially ripened berries. It also contains *solanidine* which, though poisonous, is not violently so. H. C. Long says "a small quantity of *solanine* is present in the stem and berries, but these are probably less poisonous than green potatoes."

ANIMALS AFFECTED: Cases of poisoning (*see* Chesnut) have been recorded for calves, sheep, goats and pigs, and according to Lehmann, Schraber, and Haller, the berries are poisonous to ducks and chickens.

SYMPTOMS: The characteristic symptoms, as given by Chesnut, are about the same in man and animals, *i. e.*, stupefaction, staggering, loss of speech, feeling, and consciousness; cramps, and sometimes convulsions. The pupil of the eye is generally dilated.

REMEDY AND MEANS OF CONTROL: As both the common nightshade and the three-flowered nightshade are annual plants, they may be readily exterminated by pulling or close cutting when in flower. If, however, the fruits have already formed the cut tops should be buried in the compost heap, where fermentation will destroy the vitality of the seed; or they may be burned.

BLACK HENBANE (*Hyoscyamus niger* L.) NIGHTSHADE OR POTATO FAMILY.

PLATE XXXVI.

COMMON NAMES: The black henbane is sometimes referred to as the foetid nightshade, insane root, and poison-tobacco.



Black Henbane.

Photo F. Fyfe.

DESCRIPTION: It is an annual or biennial plant from one to two and a half feet high. The stem is coarse, hairy, and sticky. The leaves on the stem are without stalks, oblong in general outline, with three to five pointed lobes or sometimes entire with wavy margins. The flowers, with very short stalks, are pale greenish-yellow, strongly and beautifully veined with deep purple. The seed vessel is very characteristic. It is like a deep narrow basket with a cover which opens when the seeds are ready for dispersal. The plant is in bloom from June to September.

DISTRIBUTION: Black henbane has become naturalized in Canada, and is found about gardens and in waste places from Nova Scotia to Ontario.

POISONOUS PROPERTIES: It is a well-known poisonous plant, but poisoning rarely occurs among stock on account of its strong foetid odour and rough foliage. Chesnut records the poisoning of chickens which ate the ripe seeds. Cornevin reports the poisoning of cows by eating the plant when mixed with other herbage. H. C. Long says: "There are numbers of cases of children having been poisoned by eating the seeds. The root has also caused accidents by being taken for other herbs, and the young shoots and leaves have been used in error as a vegetable. A case was reported in the press in 1910 in which twenty-five men and women visitors at a Davos pension suffered from the effects of eating the root of henbane given in error for horse-radish, or mixed with it. They suffered from strange hallucinations, but with prompt and careful treatment all had recovered in twelve hours." The poisonous principle is not destroyed by boiling or drying. Poisoning is due to one or more alkaloids, of which *hyoscyamine* is the chief.

SYMPTOMS: The symptoms of poisoning in animals as given by Welsby are nervo-muscular exaltation, eyelids and irides much dilated, eyes amaurotic and very bright, pulse full, temperature normal, respiration difficult and hurried, profuse salivation, muscles of neck and extremities in a state of tetanic rigidity, considerable abdominal distension, stercoraceous and renal excretories entirely suspended, death.

REMEDY AND MEANS OF CONTROL: In the case of poisoning, professional advice should be obtained. The plants should not be allowed to mature their seed, but should be grubbed out wherever seen.

THORN APPLE (*Datura Stramonium* L.) NIGHTSHADE OR POTATO FAMILY.

PLATE XXXVII.

COMMON NAMES: Among the variety of names given to this species of *Datura*, the best known are Jamestown or Jimson weed, stramonium, devil's apple, mad apple, stinkwort. The Indians speak of it as the "White man's plant."



Thorn Apple.

Photo - F. Files

DESCRIPTION: The thorn apple is a large and coarse annual from two to five feet high, with pale-green smooth stems and darker green leaves. The whole plant exhales a heavy nauseating narcotic odour. The leaves are egg-shaped, coarsely wavy toothed or angled. The flowers are white, two to four inches long, tubular, with fine teeth. The fruit or seed capsule is globular, slightly longer than wide, covered with coarse prickles, breaking open into four parts to show the numerous rather large seeds within. The plant is in bloom from May to September.

DISTRIBUTION: It has been introduced in Canada among garden seeds and is now found scattered throughout on waste ground.

POISONOUS PROPERTIES: It is a well-known narcotic poisonous plant. All parts of the plant are exceedingly poisonous, especially the seeds. Children are tempted to eat the fruit when playing where the plant is growing. Fatalities among children have occurred on several occasions in the United States.

The plant contains the three alkaloids, *daturne*, *hyoscyamine*, and *atropine*, which are highly poisonous. The toxicity is not destroyed by drying, and cattle poisoning has been recorded in the United States where the leaves were mixed with the hay. As a rule animals avoid the plant on account of its unpleasant odour and strong taste.

SYMPTOMS: The general symptoms as given by Chesnut are, "Head-ache, vertigo, nausea, extreme thirst, dry, burning skin, and general nervous confusion, with dilated pupils, loss of sight and of voluntary motion, and sometimes mania, convulsions, and death."

REMEDY AND MEANS OF CONTROL: The plants should be grubbed out or pulled wherever they have escaped from cultivation. No seeds should be allowed to mature, and all parts of the plant should be burned.

OTHER SPECIES OF DATURA.

The purple thorn-apple (*Datura Tatula* L.) is another introduced weed of a similar nature found on waste ground in Ontario. It may readily be distinguished by its purple stem and pale violet-purple flower. This and *D. Metel* L. are also narcotic poisonous plants to be equally avoided.

LOBELIA FAMILY (*Lobeliaceæ*)

INDIAN TOBACCO (*Lobelia inflata* L.)

PLATE XXXVIII.

COMMON NAMES: The Indian tobacco is frequently called wild tobacco, asthma-weed, gag-root.

DESCRIPTION: The Indian tobacco is a hairy annual, with an erect branched stem from one to three feet high. The lower leaves are oval, from one to two and a half inches long with toothed margins and short stalks. The upper leaves have no stalks, and gradually diminish into leaf-like bracts. Its numerous pale blue flowers are small, two-lipped, and rather inconspicuous in the axils of the upper leaves. The seed-pods are inflated, nearly round, with ten prominent ribs, and contain numerous brown seeds, oblong and reticulated. The plant is in bloom from July to October.

DISTRIBUTION: It is commonly found in fields and thickets from Labrador to Saskatchewan. It is native to Canada.

POISONOUS PROPERTIES: The whole plant contains an acrid milky juice, and has an unpleasant burning taste. It is used medicinally. The leaves contain the poisonous narcotic alkaloid *lobeline*. Lobeline, as well as other constituents found in lobelia, is open to further investigation, but its action is well known. Greenish remarks, "Lobeline has an action closely allied to that of nicotine; it first excites the nerve-cells and then paralyzes them." Millspaugh says, "Thanks to much reckless prescribing by many so-called botanic physicians, and to murderous intent, as well as to experimentation and careful provings, the action of this drug is pretty thoroughly known. Lobelia in large doses is a decided narcotic poison, producing effects on animals generally, bearing great similitude to somewhat smaller doses of tobacco, and *lobelina* in like manner to *nicotia*."

SYMPTOMS: The prominent symptoms of its action as given by Millspaugh are: "Great dejection, exhaustion, and mental depression, even to insensibility and loss of consciousness; nausea, and vertigo; contraction of the pupil; profuse clammy salivation; dryness and prickling in the throat; pressure in the oesophagus, with a sensation of vermicular motion, most strongly, however, in the larynx and epigastrium; sensation as of a lump in the throat; incessant and violent nausea, with pain, heat, and oppression of the respiratory tract; vomiting, followed by great prostration; violent and painful cardiac constriction; griping and drawing abdominal pains; increased urine, easily decomposing and depositing much uric acid; violent racking paroxysmal cough, with ropy expectoration; small, irregular, slow pulse; general weakness and oppression, more marked in



Indian Tobacco.

Photo- F. Fyfe

the thorax; violent spasmodic pains, with paralytic feeling, especially in the left arm, weariness of the limbs, with cramps in the gastrocnemii; and sensation of chill and fever. Death is usually preceded by insensibility and convulsions."

REMEDY AND MEANS OF CONTROL: Professional advice should be obtained immediately.

Being an annual plant, Indian tobacco may be readily destroyed by hand-pulling or grubbing out wherever it is found in small patches. On larger areas, enriching the soil and cultivation will in time choke it out.

OTHER SPECIES OF LOBELIA.

The great lobelia (*Lobelia syphilitica* L.) is suspected of being poisonous. It is native to Ontario, and is found in low grounds.

According to Pammel, the cardinal flower (*L. cardinalis* L.) found in low grounds in New Brunswick to Ontario, and the spiked lobelia (*L. spicata* Lam.) another native found in gravelly or sandy soil, from Prince Edward Island to Ontario, have been reported as poisonous.



COMPOSITE OR THISTLE FAMILY (*Compositæ*)

WHITE SNAKEROOT (*Eupatorium ageratoidea* L. f.) (*Eupatorium urticaefolium* Reich.)

PLATE XXXIX.

COMMON NAMES:—The white snakeroot is also known by the names white sanicle, Indian sanicle, squawweed, richweed, white top, and deerwort-boneset.

DESCRIPTION:—This attractive, slender perennial of the woods grows to a considerable height and affords a supply of rich, green herbage in the late summer and autumn. The leaves are placed opposite one another on slender stalks. They are from three to six inches long and from one to three inches wide, ovate, thin, sharply pointed at the apex; rounded, straight or sometimes heart-shaped at the base. Their margins are coarsely and usually sharply toothed, sometimes varying to round-toothed. The inflorescence is rather loose and open. Each flowering head, consisting of from ten to thirty bright white flowers, is about a quarter of an inch wide and slightly longer, somewhat bell-shaped.

DISTRIBUTION:—Snakeroot is found in rich, damp woods or on the borders of open woods in Canada from New Brunswick to Ontario. Sometimes it grows in abundance on hillsides and lately cleared land.

POISONOUS PROPERTIES:—Although it is apparent that white snakeroot is an unwholesome plant, very little is known of its chemical constituents. The earlier evidence of its connection with the disease known as "milk-sickness" is of a rather contradictory nature. Selby states that it is a "dangerous poisonous plant for Ohio, particularly in the more northerly districts. Animals which feed upon it, more especially cattle and sheep, are frequently seized by the disease known as 'trembles', often with fatal results. Persons who use the milk or butter from cows suffering from this disease are many times attacked by 'milk-sickness', at times with fatal results." He quotes from E. L. Mosely who made a chemical analysis of this plant and found considerable quantities of aluminum phosphate in the leaves. Moseley contends that the effect of feeding white snakeroot to various animals is identical with the symptoms of 'trembles'. On the other hand we have the report of A. C. Crawford as follows:—

"To sum up, it certainly cannot be said that it has been proved that milksickness is due to any constituent of *E. urticaefolium*. The transmission of the disease by eating small quantities of meat or milk of animals sick with the 'trembles,' and the fact that cooked meat or boiled milk does not produce this disorder, point primarily rather to a parasitic origin, while the fact that *Eupatorium urticaefolium* is abundant in areas where the disease is not known and absent in some milksick districts also indicates that the plant has no relation to the disease. If it does, it would be only



White Snakeroot.

Photo F. F. G.

an accidental carrier of some pathogenic organism. According to reports the same flora may be in areas in which 'trembles' occur as in those free from it, and milk-sickness is also said to occur where no vegetation grows (inclosed pens). The disease also has disappeared from an area after simply clearing the woodland where it occurred and turning it into pasture. Again, severe epidemics have occurred in winter when the foliage has disappeared, which would tend to exclude the higher, non-evergreen plants as the cause of this disorder."

The later experiments however, of Curtis and Wolf, as well as those of Marsh and Clawson (1917) are conclusive in showing that, apart from the evident connection of milk-sickness with the symptoms caused by the ingestion of snakeroot, there is no doubt that this plant is poisonous to stock. The former says: ". . . 'white snakeroot had previously been claimed by Moseley to cause trembles in animals. This claim has been substantiated by experiments with sheep in which green plants of *E. agerata* were fed"; and the latter: ". . . it has been clearly demonstrated that *E. urticifolium* must be counted as one of the rather important stock-poisoning plants which produces serious losses of domestic animals." These experiments also showed that the plant loses a large part of its toxicity in drying.

In the following year, 1918, the experiments of Wolf, Curtis & Kaupp, in North Carolina, also proved that trembles and milksickness were due to this plant. According to them, the disease may appear "at any season of the year, but is most prevalent in late summer and autumn, especially when other vegetation is scarce because of drought. The disease is frequently fatal in domestic animals while the sequel of milksickness in man, in case of recovery, is lasting debility." "During the experimentation, 31 fatal cases of trembles and milksickness have been developed among the 44 ewes and lambs that were employed in some phase of the experimentation involving the feeding of white snakeroot. Two of these lambs contracted genuine cases of milksickness by suckling their mothers, demonstrating that the disease may be transmitted through the milk. This fact has for a long time been a matter of common belief among farmers. Furthermore, animals in lactation, having access to white snakeroot, may be apparently normal yet are capable of transmitting milksickness through their milk."

ANIMALS AFFECTED:—The experiments referred to above proved that white snakeroot was poisonous to all domestic animals.

SYMPTOMS:—The action of the poison is cumulative. The general symptoms as given by Marsh and Clawson are, trembling, especially of the nose and legs, more marked after exercise; depression and inactivity; constipation with nausea and vomiting; pronounced weakness; difficulty in standing, the animals sometimes remaining down for a prolonged period before death.

REMEDY AND MEANS OF CONTROL:—As the plant produces an enormous quantity of small seeds it should not be allowed to reach maturity. Grubbing out or repeated cutting is the only effectual means of getting rid of this weed.

SNEEZEWEED (*Helenium autumnale* L.) THISTLE FAMILY.

PLATE XL.

COMMON NAMES:—Among the popular names by which sneezeweed is known are false sunflower, swamp sunflower, and yellow ox-eye.

DESCRIPTION:—The sneezeweed is an erect, soft, downy or nearly smooth perennial plant, growing to a height of two to six feet. The flowering heads are numerous, showy and bright yellow. Each head consists of a central raised globular mass of numerous small flowers, surrounded by ten to eighteen bright yellow ray flowers. The leaves are without stalks, firm, oblong, pointed at the apex and narrowed at the base. The leaves are prolonged more or less down the stem. The seeds are top-shaped, ribbed, and hairy, with five to eight pointed scales at one end. *Helenium* blooms profusely from August to the end of October, and is often cultivated for that reason.

DISTRIBUTION:—Sneezeweed is a native of Canadian soil, and is found in swamps, wet meadows, and along streams from Quebec to British Columbia.

POISONOUS PROPERTIES:—This plant is known to be poisonous when eaten in any quantity. As a rule cattle avoid it. Chesnut says:—

"Sheep, cattle, and horses that are unfamiliar with the plant are often poisoned by it when driven to localities where it is abundant. As a rule, these animals avoid it, but it is said they sometimes develop a taste for it and are quickly killed by eating it in large quantity. The poisonous constituent has not been closely investigated, but it is known that it exists principally in the flowers. The young plants appear to be only very slightly dangerous. In the mature ones the amount of poison present seems to vary greatly even in the same field. The symptoms, as determined by experiments made in Mississippi upon calves, are an accelerated pulse, difficult breathing, staggering, and extreme sensitiveness to the touch. In fatal cases, death is preceded by spasms and convulsions. Melted lard has been used with good effect in offsetting the action of the poison when given before the spasms began."

REMEDY AND MEANS OF CONTROL:—As the plant prefers wet soil, drainage and cultivation are the best means of preventing its growth. In small patches it may be hand-pulled taking care to get up the perennial roots and to avoid scattering the seeds if they have already formed.



Sneezeweed.

Photo—P. Fyles.

RAGWORT (*Senecio Jacobaea* L.) THISTLE FAMILY.

PLATE XLI. (Facing p. 104)

COMMON NAMES: Other names given to this weed are British ragwort, tansy-ragwort, staggerwort, and stinking-willie.

DESCRIPTION: The common ragwort is a perennial (or biennial) with short, thick rootstocks. It is sometimes quite woolly or almost devoid of hairs. The stems are stout, simple or branched above, with deeply-lobed and incised green leaves. The flower heads are arranged in a broad, flat-topped cluster, each head bright yellow, in form resembling a small daisy. It is in full bloom from July to September. The seeds are small and easily blown about by the wind.

DISTRIBUTION: Ragwort has been introduced from Europe, and is now naturalized in Canada from Newfoundland to Quebec and Ontario. It is found in ballast, along roadsides, in waste places and pastures.

POISONOUS PROPERTIES: This weed has been the cause of considerable loss among cattle in Canada. At first it was not generally recognized that there was any connection between ragwort and the serious disease of the liver (hepatic cirrhosis) known in Canada as the Pictou cattle disease. The late Dr. Fletcher called attention to this suggestion in 1891. "This plant," he says, "is well known in Pictou county, and it is stated that the majority of the farmers there believe that to it and it alone are they indebted for what is known as the 'Pictou cattle disease.'"

At that time the average yearly loss in Pictou county, Nova Scotia, was 200 head of cattle. The Dominion Department of Agriculture made careful and extensive investigations (1903-6) which proved the weed ragwort to be the cause of the disease. As it was found that sheep were capable of assimilating the plant without injury, it was kept in check by pasturing them on the infested areas.

In South Africa the same disease, locally called Molteno cattle sickness, appeared among horses as well as cattle, and was attributed to a closely allied species of ragwort. In New Zealand considerable attention was given to this disease among horses, under the name of the Winton disease, and a great effort was made to eradicate the weed (*Senecio Jacobaea*). With this object in view, sheep were pastured on an area of 4,000 acres where ragwort grew very abundantly. Although, in about a year's time, several mortalities among the sheep occurred, Gilruth came to the conclusion that, if the weed is not too prevalent, sheep may, with a few exceptions, graze upon it daily without injury.

In England, recent poisoning (1917) of cattle has been reported (Board of Agriculture) from feeding them on dried forage containing ragwort. In this case, as in others, the feeding had been going on for a considerable period before any visible effects of the poison occurred,

showing that the action of the poison is both insidious and cumulative. Little is known of the actively poisonous principle, but it is evidently one or more of the alkaloids which have been isolated from various species of ragwort.

SYMPTOMS: In regard to the cases of poisoning in Canada it was found that the disease was progressive, and to the careful observer certain premonitory symptoms were visible sometimes months before more characteristic manifestations appeared. In one case reported upon by Pethick, by actual experiment which lasted eighteen months and twenty-one days, death occurred only forty-four days after the first visible symptoms. "In this case," he says, "as indeed in nearly all others, we noticed a peculiar bleached appearance of the hair, which seemed to have lost its lustre, a desire to be alone, irritation of temper or nervousness, occasional chills, although in a moderately warm stable. This animal would stand and shiver while the healthy members of the herd appeared comfortable. The bowels are irregular, the pulse at this stage is fast although quite strong, temperature slightly above normal." Later and more characteristic symptoms are: visible mucous membrane pale, eyes amaurotic, slight diarrhoea, emaciation, followed by great weakness, staggering gait, inability to rise, and finally death.

REMEDY AND MEANS OF CONTROL: Although strychnine and iron may be used in incipient cases with beneficial results, it was shown by these experiments that measures of this kind are of little real value. The best means of controlling the disease is through the eradication of the weed, and for this purpose (Report Veterinary Director-General, 1911), "The farmers in the counties of Pictou and Antigonish, as also those portions of Prince Edward Island where the weed and the disease existed, were strongly advised to make use of sheep as an economical and profitable means of eradicating this troublesome plant. Numerous farmers followed this advice, but many other methods of eradicating ragwort were also inaugurated, while the practice of removing it from the hay when cut was almost universally adopted. As a consequence, loss from the disease has become almost unknown."

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Ragwort *Plate XL.*

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